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NOTE.—Communications relative to the editorial management should be addressed to MR. ROTHWELL. Articles written by MR. RAYMOND will be signed thus *

Business communications for the Western Department should be addressed to the Western Office at Denver, Colo.

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Owing to a pressure of other work, we are compelled to postpone the publication of our Index to Vol. XXIV., until January 26.

J. F. L. SCHIRMER.

We copy elsewhere from a Denver exchange the only account which we have seen of the death in December last of J. F. L. SCHIRMER, for many years at the head of the United States assay office at Denver. MR. SCHIRMER'S professional ability commanded universal respect, as his cordial and genial manners inspired universal affection. He will be painfully missed and tenderly remembered by an extensive circle of friends, among whom we claim the right to be counted.

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THE CHICAGO WATER WORKS.

Some time ago we felt called upon to animadvert upon the terms of the advertisement for two pumping engines by the Chicago Board of Public Works, and have waited patiently for the testing of the engine and a settlement with the contractors, to justify the strictures we were compelled to make. The report of the Department of Public Works for 1876 has been recently put into our hands; and from it we learn what is to be known of the details of the trial. As these results seem fully to confirm the propriety of our preceding view, we desire, in a few additional remarks, to give it further enforcement. In our former article we said, in substance, that the printed specification called for two 15-million engines, connected to three boilers, two of which were to be sufficient to furnish all the steam required; that the engines might be called upon to run continuously day and night, seven days in the week, for a whole year; that at any time during that year they might be unexpectedly called upon to sustain a duty test of six consecutive days of 24 hours each, and to show a duty of 90 millions, to the satisfaction, on all points involved, of a body of men in whose selection or appointment the contractor had no voice, and from whose decision no appeal was provided, the penal obligations being simply destructive.

Upon this extraordinary requirement we made the following comments: That the limitation of the boilers to two in number, each requiring something like 12,000 square feet of heating surface, looked intimidating to most builders on account of the inordinate size and dangerous character of such work, but that the duty requirement exceeded all reason. We pointed out that engineers are by no means agreed as to the possibility of reaching so high a duty even on short trials and under favorable circumstances, yet the Chicago Board of Works required its exhibition for six running days, cut without notice from any part of the year, of continuous operation. The effect of all this, we said, was to "bulldoze" constructors and would-be bidders who feared that they might be held to these unprecedented requirements. It was clear, on the other hand, that a Water Board could, by taking advantage of a little ambiguity of language, accept the work of a favored party, even though falling below the nominal standard. In fact, as we pointed out, such absurdly high requirements render the contract system nugatory, producing intimidation, and saving incompetent contractors alive by crowding in imperfect returns. Reasonable requirements and strict construction are what is really demanded. To make cast-iron requisitions and India-rubber interpretations is to enact a farce which might easily degenerate into a fraud.

Now let us judge of these comments by the light of actual proceedings and final returns. After an utter failure in the time-proviso of the advertisement, the engines built under it were at last offered for trial, and the Board appointed five commissioners to make the test. Conspicuous among them were Mr. CHARLES HERMANY, chief engineer of the Louisville Water Works, and Mr. THOMAS J. WHITMAN, chief engineer of the St. Louis Works, gentlemen who, for practical experience and approved ability in this department, have no superiors. They tried the engines every way and often, but found them wanting, and so reported. So far at least as duty was concerned, the failure was complete, for they could not get over 77,000,000, even for a few hours, against 90,000,000 guaranteed for six consecutive days.

Now what followed? A reconstruction of the jury, a counting out of the notable experts, Messrs. HERMANY and WHITMAN, and a new trial under the three remaining commissioners. If the names of two of these have ever been identified with similar trials, we do not happen to know it. Then ensued not a six days' continuous trial, but a 48 hour trial and a verdict of 99,000,000. The discrepancy between this and the first result is accounted for in their report by a wholesale impeachment of the propriety and accuracy of the first trial. We are asked to believe that Chief Engineers HERMANY and WHITMAN, whose names are connected with the most elaborate, exact, and instructive reports to be found anywhere on this subject, consented to go into this most important and expensive trial, on which the eyes of the whole engineering world were eagerly fixed, "with boilers filled with scale and mud" "in extreme cold weather," "with injudicious firing," with "unreliable means of measuring both the flow of water delivered and the height to which it was raised."

What, we ask, has become of the continuous year's run, "day and night, seven days in the week?" What of the sudden call to the six-day duty trial?

We ask, also, whether the two engines were run at the same time, using two boilers only, out of the three that were to be furnished? If this were done, as the contract required, what does the report of trial mean when it speaks of "six cylindrical, tubular boilers six feet and a half in diameter and 16 feet long?" This is an important question in view of the insufficient amount of fire surface they furnished.

Finally, for how much of this retractation, permission, substitution, alteration, or whatever else, is the jury responsible? or how much of it emanated from the same department which originated the impossible requisitions? Did the city demand one thing, and agree to accept another? or, was the conclusion forced by the over-ruling authority of a board of "acknowledged impartiality and distinguished ability?" Let the following extract from the letter of instructions, under which the experts were directed to work, speak:

"It is thought best that but one engine should be tested at a time, and that the duration of the trial of each engine should not be less than 36 hours (a misprint perhaps for six consecutive days). Should the first trial of the engine fail, the commissioners are required to make still further trials to ascertain what higher boiler pressure if any, under 80 *pounds* will develop that duty."

The irrepressible conflict between this last proviso for an easy come-down, and the proviso of the advertisement that "the pressure of steam on the boilers shall not at any time be greater than 60 pounds per square inch" may occur to the mind of the present reader, but the idea of crowding boilers, built and subjected to the "government test for strength" of 60 pounds, to a pressure of 80, with a view to making things easy for the contractor, probably did not occur to all who might otherwise have been bidders under the now famous advertisement.

Comment can scarcely add clearness to this case. The power controlling this business first set up impossible requisitions, and then connived at their evasion; it first intimidated, and then accommodated. It is an unfortunate circumstance that the persons intimidated were not the persons accommodated. The party not scared by the imposing rigor of the conditions of the contract proves to be the party who did not need to be scared, because these conditions were not to be applied to him. We are not called upon to charge anything worse than folly upon anybody concerned; but we regard that as a very bad kind of folly which gives to an innocent transaction all the suspicious appearances and all the evil effects of a fraud.

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THE GILPIN COUNTY GOLD MINES.

Staff Correspondence of the Engineering and Mining Journal.

Gilpin County, Colorado, is one of the few distinctly and exclusively gold mining districts in the West, which began its history on the basis of that metal, has produced almost nothing else up to the present, and gives no indication of any change of product in the future. There are few parallel cases in the country. As a rule, gold has been the first metal discovered in a majority of the western mining districts. In most of these, silver has after a time become the staple or at least an equal product. With the Gilpin County mines there has been no such change. Excepting Virginia City, Nevada, and Grass Valley, Cal., it has no superior or rival as a gold-producing camp. It will therefore be encouraging to those gold maniacs in our midst, who fear that the production of the yellow metal is on the decrease so rapidly, that silver can never enter into competition with it as a money standard, if it can be shown that the resources of this one camp at least are practically inexhaustible and steadily on the increase. And from this it may also be possible to show why the numberless other districts scattered throughout the West, with as abundant resources as Gilpin County, have not yet attained its prominence.

The production of these mines for the year just ended is reported by the *Register* as follows:

Retort gold from stamp mills	$1,272,932 81
Bar gold and copper from smelting works	778,042 92
Gold express by and manufactured	45,000 00
Ores shipped out of county	80,000 00
	$2,175,975 73

Separated into metals, the exports have been: Gold, $1,943,534 40; Silver, $161,245 63; Copper, $70,195 70; and Lead, $1,000.*

A comparison of these figures with those of previous years will be of interest. The figures given are round numbers collected largely from the reports of the

* We are indebted for the above figures mainly to an excellent article in the Central City *Register*.

United States Commissioners since 1867, and before that date, by a comparison of the most reliable estimates.

From 1859 to 1869 (10 years)	$9,000,000
For the year 1869	1,500,000
" 1870	1,100,000
" 1871	1,300,000
" 1872	1,400,000
" 1873	1,550,000
" 1874	1,650,000
" 1875	1,775,000
" 1876	1,900,000
" 1877	2,180,000
Total for 18 years	$22,955,000

The ore mined in the county is a gold quartz containing more or less iron and copper pyrites, in which matrix the precious metals are carried. According as it is heavily base or not, it is separated into two classes, the latter (mainly quartz,) being treated by raw amalgamation, and the former (pyritiferous) being smelted. During 1877, there were mined and milled 140,700 tons of quartz, which produced on an average $8.10 per ton, the saving effected on amalgamation being between 60 and 70 per cent. During the same time, 6,400 tons of base ore were smelted, which yielded in gold, silver and copper about $134 per ton, about 10 per cent. of this amount representing the value of the copper, 15½ per cent. the silver, and the balance gold, excluding a very small quantity of lead.

Perhaps the records of the mill ore afford the best means of judging of the comparative condition of the district. Upon its low grade ore the fortunes of every mining camp must finally depend. These exist in bulk, require less manipulation, and in every way may be handled with the smallest cost. Measured by this standard, it is found that the tonnage of the county in mill rock has this year, exceeded that of any season since the flush times, when, of course, the returns would not represent fairly the permanent standing of the mines. The grade of the ore has also been less, indicating more economy and better management. But the decrease in value per ton is not indicative of any growing poverty in the mines, as depth is gained. In fact, the contrary is shown, for the ratio of increase in tonnage is larger than the ratio of decrease in grade.

At the close of the year nearly 600 stamps were working, and during the 12 months the average has been 628 head. This corresponds to a work of three-quarters of a ton per stamp every 24 hours.

The gold produce was sold for $16.03 per ounce, corresponding to a fineness of 775 thousandths. This is for both stamps and gulch product, the proportion of the latter being, however, very little.

Owing to the uniformity of its ores, the abundance of auriferous iron pyrites, which serves as a most economical flux, and its location, so central as regards the three northern and most productive countries of Colorado. The Boston and Colorado Smelting Works which were open in this district in 1867 have long ago become the central reduction establishment of the State, and are to-day the largest producers of precious bullion in the country, their shipments during 1877 having amounted to $2,154,000, all but a very small quantity being gold and silver. During the ten years of their existence, they have turned out about $10,000,000, and have gained a position in the State which will be permanent. Of other reduction establishments, the district is supplied with twenty-three stamp mills, two custom concentration works, and one ore sampling floor, where rock to be shipped out of the county may be valued. The latter is controlled by the Golden Smelting Works, who are heavy purchasers of ore of the smelting grade.

Turning now from a general consideration of the district to the great mines on which its fortunes securely rest, a most gratifying exhibit will be found. Every one at all acquainted with the precious metal industry will know the names of many of them as well almost as of the Bonanza mines. In the early days of the country, the Bobtail, Gregory, Grinnell, Kansas, Bates, Buell, Burroughs and Kent County, were household words in Wall Street. The connection well nigh killed them, and it was years before they recovered from the speculations and peculations of which they were the basis in those days. To-day, however, they rank among the first mines of their class in the world, and with only two exceptions are not within the reach of the brokers. All of the list but the Buell are now being vigorously worked, and with most satisfactory results, and besides them there are a very large number, whose annual product though not mounting up into the hundreds of thousands, are yet contributing heavily to the output of the camp, and in a few years more will rank with the best. Of these are the Omaha, Comstock, Alps-Mackie, O. K., Gardner, Furnald, Gregory Second, Hubert, St. Louis, Pleasant View, and Prize. The greatest depth yet attained on any lode is in the Ophir shaft of the Burroughs, which is 1,000 feet deep. More than a half dozen other mines have attained a depth of 700 feet.

If one looks for the causes of success in this district, it will be found to lie not so much in the intrinsic value of the mines, for there are dozens of gold districts in Colorado, New Mexico, Montana, and California, where as good, if not better veins occur in equal profusion. Nor have the miners of the camp to thank any reduction establishments for the prominence of their present position. The reason is to be found in the energy, perseverance, and "grit" of the citizens who came to the district in its early days to stay, and have stayed, in the face of every discouragement imaginable to the industry. More than this, such of the miners as are now working have been developed and managed upon business principles. Their success was therefore assured when time was given them to be cleared from the wrecks of former years.

THE PHILADELPHIA AND READING R. R. CO.'S ANNUAL MEETING.

The annual meeting of the Philadelphia & Reading Railroad Company was held in Philadelphia on Monday, the 14th inst. The report of its president shows the following results of the business of 1877 as compared with 1876:

	1876.		1877.			Per Cent.	
Travel.	10,936,157 equal to 1,131,949 through passengers	$2,433,685	6,674,889 equal to 799,088 through passengers	$1,610,050	$823,635	Dec	33 8-40
	Tons.		Tons.				
Mdse	2,493,276 10-20	2,919,501	2,837,648 8-10	2,913,588	35,913	Dec	1 2-40
Coal	4,622,916	6,708,682	5,905,194 7-20	7,505,207	796,525	Inc.	11 9-40
Mail		54,484		41,587	12,897	Dec	23 7-10
Miscellaneous		81,159		72,478	8,681	Dec	10 7-10
Gross receipts		$12,227,511		$12,142,910	$84,601	Dec	7-10
Gross expenses		8,510,350		7,751,693	758,657	Dec	8 9-10
Net profits		$3,717,161		$4,391,217	$674,056	Inc.	18 1-10

From this table it will be observed that the net profits in 1877, were $674,056 more than in 1876, while, were it not for the large number of passengers and the large amount of general merchandise carried in the Centennial year, the comparison of 1876 would have been much more unfavorable.

The following is a condensed statement showing the result of the year's business of the railroad company:

As condensed from the Transportation and Income account, the result of the year's business may be stated as follows:

Receipts over cost of working the road			$4,391,217 47
Profit on steam colliers			240,731 50
State tax on dividends refunded, profit on the line of Richmond coal barges, etc., less depreciation in value on materials, and drawbacks on traffic of 1876			95,167 03
			$4,727,116 00
From which deduct:—			
Loss upon the business of the Schuylkill Canal	$248,656 72		
Less profit upon the business of the Schuylkill Canal Transportation Line	74,901 73		
		$173,754 99	
Loss upon the business of the Susquehanna Canal		180,339 21	
			354,094 20
			$4,373,021 80
From which deduct:			
Interest on bonded debt		$4,185,221 50	
Interest on bonds and mortgages		112,664 36	
Debt balance of interest account		238,586 54	
			$4,536,472 40
Debt balance for year charged to profit and loss			$163,450 60

The following is a statement of the business of the Philadelphia & Reading Coal & Iron Co. for 1877:

Gross expenses	$10,584,847 34
Less gross receipts	10,007,031 94
	$557,815 40

This loss of $577,815 40 is further increased to $755,478 37 by the following items, principally of depreciation of stock and materials and equipments, as per inventory of November 30, 1877:

Loss as per statement of general income			$577,815 40
Add for depreciation of value of—			
Stock coal on hand	$239,173 09		
Stock at furnaces	4,990 46		
Portsmouth property	10,120 27		
Colliery equipments	49,363 61		
Iron ore equipments	2,237 77		
Pottsville corral	1,234 20		
		$307,119 40	
Deduct for increased values as per inventory, Nov. 30, 1877			
Of dead work at collieries	52,496 07		
Of supplies at collieries	10,159 61		
Of iron ore mine implements	4,670 41		
Of dead work at iron ore mines	74,292 12		
Of supplies at iron ore mines	2,231 45		
Of Pottsville machinery depot	20,310 52		
Of stock at furnaces	1,638 31		
Of iron ore stock	8,089 93		
		173,898 42	
			133,220 98
Add for bad debts of current year			47,406 93
Add for expenses of leases to Crocker Bros. for storing iron			2,148 08
Total			$760,591 39
From which deduct:			
Profit of rolling mill		$8,154 89	
Amount received in 1877 for business of 1876		1,958 13	
			5,113 02
Total loss for the year, including depreciation			$755,478 37

The interest account of the Coal & Iron Company for the year was $1,020,378.26, which, added to the loss noted above, and the railroad deficiency after payment of interest, makes a total deficiency for both companies of $1,939,307.23.

By the company's funding scheme, the total amount of scrip to be issued will be as follows:

In year ending November 30,	1877	$923,707 50
" " "	1878	1,881,165 00
" " "	1879	1,881,165 00
" " "	1880	1,585,875 00
" " "	1881	1,256,835 00
" " "	1882	628,417 50
		$8,157,165 00

The floating indebtedness January 12, 1878, was $6,674,980.52, as compared with $8,272,359.93, as reported at the previous annual meeting.

The actual cost of mining, preparing, and delivering coal into the railroad cars for the year was $1.03 9-10 per ton, but as this sum includes the cost of all new work and improvements done and erected in the year, all of which have been charged to working expenses, the actual cost of mining was less than $1 per ton.

The following extracts from the report indicate that Mr. Gowen realizes that the course he pursued last year was the only sound one, although financial necessities compel him to diverge from it:

"Notwithstanding, however, the bad result of the business of the Coal and Iron Company, when it is considered that that company paid to the Railroad Company for coal freights alone over $5,000,000 in cash, and that the general merchandise and passenger receipts of the latter company were greatly increased by the business resulting from the large product of coal, it is evident that the profits of the Railroad Company from the business of the Coal and Iron Company so greatly exceed the losses of the latter, that taking into consideration the low prices and

depressed condition of business, the joint result of the operations of the two companies must be considered as favorable as could have been expected. . . .

"It must be evident, therefore, that with anything like a fair price for coal assured for the future, the estates and properties of the Company will become very remunerative to the shareholders. In the ordinary course of business, with the large production and great competition, fair prices could not be expected until the demand overtakes the supply. Although there can be but little doubt that relief would eventually be obtained by a demand for coal largely increased at home, by low prices and gradually extending to foreign markets hitherto inaccessible to American shipments, and though there is still less doubt that the favorable location of the Company's mines, together with the great transportation facilities, will enable it to make up in the long run in tonnage what may be lost in price, it has been considered prudent by the managers, in view especially of the indebtedness of the Company, to accelerate the advent of fair prices, by uniting with all other interests in placing the anthracite coal trade under the management of a Board of Control, composed of representatives of all the producing districts of the State, authorized to carry into effect the details of an agreement for the pro rata distribution of the entire tonnage, and the payment and collection of penalties for over-shipments of quotas by any interest."

Mr. Gowen replies to the charges made against him by Mr. Chas. E. Smith, a former president of the company, as follows:

"1st. It is not true that any dividends were made which were not earned, except upon the hypothesis that it was necessary to reserve the actual profits of the Railroad Company which were due to its stockholders for the purpose of paying the interest upon the cost of the property of the Coal and Iron Company, pending the period of the investment of the money for its purchase, and the improvement and development of the estate, which interest was, in every respect, an entirely proper charge to the capital of the Coal and Iron Company.

"2d. It is not true that the existence of the floating debt was ever attempted to be concealed from Mr. Smith, or that it was at all unknown to him until November of 1876. Mr. Smith was at all times fully cognizant of it, took part time and again at meetings at which its existence and extent were discussed, and on or about the first day of October, 1876, when the President of the company was in the city of New York, engaged in negotiations with creditors for the extension of the floating debt; and when the amount of such debt had become, as it were, the public property of the newspapers, Mr. Charles E. Smith was in the office of the Company at Philadelphia, as awaiting with anxiety, which, if not felt, was at least well simulated, the arrival of a telegraphic dispatch from the President announcing the success of his mission.

"3d. It is not true that the exact amount of the floating debt of the Railroad Company was not properly returned at all times to the authorities of the State, and the so-called discrepancies alleged in Mr. Smith's statement are made up by including other items, principally advances on account of purchase of bonds, which, in no sense whatever, constitute the floating debt of the Railroad Co.

"4th. The so-called improper transfer of floating debt from the books of the Railroad Company to those of the Coal and Iron Company was simply placing upon the books of the latter company the bills payable issued by it for its use, and which it was primarily liable to pay. The fact that to give credit to and increase the market value of such paper it had been accepted by the Railroad Company, who placed their name upon it for the benefit of the Coal and Iron Company, did not require that the bills issued should be entered as bills payable upon the books of both companies, thereby doubling the amount of obligations actually outstanding, and as it was proper that this paper should be upon the books of that company primarily liable for its payment, and for whose benefit it was issued, the transfer was entirely right and proper, but when it became necessary for the Reading Railroad Company to negotiate with the creditors of both companies for an extension of time for the payment of the floating debt, the whole of the indebtedness was assumed by the Railroad Company, and at once entered upon its own books.

"The managers of the Company are well aware that as they act in a fiduciary capacity, it becomes their duty to answer all charges which may be made against the integrity of their management, irrespective of the source from whence they came or the motive which actuates him who gives them utterance; and though it is not intended to make the annual meeting of the shareholders the arena for any personal dispute or discussions, the managers cannot but give utterance to the conviction that forces itself upon them, that if Mr. Charles E. Smith, for eight years a president and for six years a manager of, and during the entire latter period in close personal relations with that particular officer who had charge of the accounting department, and who had been his own confidential clerk, knew nothing of the financial condition of the Company, he has been guilty of such shameful imbecility and incapacity that the stockholders are to be congratulated that his place in the Board has been filled by one who is not likely ever to put in a plea of ignorance in order to shield himself from responsibility; but if, on the other hand, Mr. Smith, knowing full well the condition of the Company, and having taken advantage of his early knowledge of its affairs to sell the majority of his own stock at high prices, and being grievously disappointed in an attempt made by him to change the management at the last election, has either out of personal revenge or for any motive joined the enemies of the Company with a view to injure its credit, then, in the opinion of all honest men, he must be classed amongst those who are not permitted to take refuge in the sanctuary of folly to escape from the stigma of their proper designation."

THE SCOTCH PIG-IRON TRADE.—1877.

By Messrs. John E. Swan & Bros.

The total make of the furnaces this year, is only 982,000 tons, against 1,103,000 tons in 1876, showing a decrease of 121,000 tons. This arises from a conviction on the part of our ironmasters, that it is of paramount importance to devote themselves to reducing their oncosts by a more general adoption of the gas principles, thus utilizing the surplus heat, and also constructing much larger furnaces, which are acknowledged to work more economically and yield heavier casts. These alterations and reconstructions have gone on uninterruptedly since the market receded to such low prices, and there are now 37 furnaces on the new principle blowing, out of a total of 86 in operation, and 155 erected in Scotland. The average number of furnaces in blast during the year was 103, showing a production of about 184 tons per furnace per week, as against 182 tons per week in 1876. In view of the current reduced values, our ironmasters met on 25th of July, and resolved to extinguish, on the 11th of August, about 22 of the furnaces, and if no improvement supervenes, it is quite probable that a further reduction of output may take place. As this means a greater cost per ton to the makers, and a smaller basis of iron for the trade, the prospect is not by any means so pleasant as could be wished. Ordinary blast furnaces were first erected in Scotland in the years of 1753-1760, about the size of some of the largest cupolas in our modern foundries; and after a lapse of more than a century, they are now built up to 93 feet in height and about 18½ feet in breadth, the abundance and cheapness of coals, ironstone, and other minerals, having fostered a conservative and non-inventive policy for years, but this has now quite broken down, in view of the great competition and laudable economy in other districts. Gas furnaces were tried in 1840, but the experiment was unsuccessful. At present, we have 30 furnaces fewer in activity, than at the corresponding date last year. As far as can be ascertained, there are 974 furnaces of all descriptions erected in Great Britain, of which about 489 are in blast at this date.

THE LEAD MARKET, 1877.

We make the following extracts from a review published by Mr. EDWARD A. CASWELL, metal broker, 240 Pearl Street:

"The dangerous competitors of Missouri miners to-day are not reductions in the tariff, but increase of the argentiferous lead productions. Territories which have advanced the figures of their collective output in five years' time by steadily increasing steps from 13,000 tons to over 45,000 tons, may well be regarded with apprehension, and their growth be watched with jealous interest.

"The abolition of our lead tariff still seems to be to many lead producers an evil to be dreaded and prevented, while in reality it is a question of small moment. With free trade to-day foreign pig lead would cost about 4¼ cents currency laid down in New York, and it is not likely that the price will at any future time decline any further, because, at rates only a little lower, Spanish production begins to fall off, so that the removal of the tariff to-day could only affect the price of our home productions one quarter of a cent. It may be urged that free trade would prevent an advance, but as stated above, domestic production to-day threatens far greater obstacles to any serious advance in lead than would free trade, for reports from all over the country indicate an increase in 1878 over that of 1877.

"The question is frequently asked 'Where, then, *must* the decline in lead stop?' to which the general answer may be made, 'Wherever it meets the world's market,' that is to say, at export price, now about 3¾ cents currency per pound. There are, however, very strong checking causes at considerable higher limits. Thus, for example, the cartridge demand, at a range between 4c. and 4·40c. currency, would carry off from 4,000 to 10,000 tons per annum, depending on the wars in Europe. The Chinese and Japanese demand (all told about 16,000 tons per annum) can be obtained in competition with England at a rate equal to about four cents in New York. This trade, however, can only be worked up slowly with great perseverance, and is a feature of the future rather than the present. Again, at four cents in New York, lead pipe would in many cases compete with iron, and the consumption of white lead would be materially increased, thus affording a broader outlet for lead, and helping to check a decline. To these facts must be added the probability that at these low rates many mines and prospects badly situated, or managed, would cease to produce. While, therefore, a calm survey of present figures and future outlook forbids the hope that lead will again reach the prices of the early months of 1877, we may feel tolerably certain that the disastrous decline of this year cannot be repeated, and that prices cannot for some time to come fall below 3¾ cents in New York, even should they touch that ultra low limit."

SUPPLIES.

	1873. Tons.	1874. Tons.	1875. Tons.	1876. Tons.	1877. Tons.
Importations	22,114	17,674	7,305	4,685	6,224
Government sales	2,400	4,125	915	1,050	200
Missouri Production	13,433	15,259	17,053	17,165	22,084
Galena "	6,550	5,500	5,000	6,425	5,730
Utah, Nevada, California etc.,	18,000	26,000	31,200	33,630	45,311
	62,497	68,558	61,473	62,955	79,549

APPROXIMATE DISTRIBUTION OF THE SUPPLY.

	1875.	1876.	1877.
Imports—Cartridges, etc	515	4,015	6,224
" Corrosion	6,790	670	000
Missouri and Galena, corrosion	17,000	18,425	19,500
Desilverized "	10,000	11,486	16,100
Missouri pipe, shot, etc	5,053	5,165	8,314
Desilverized and Govt., pipe, shot, etc	9,615	20,694	26,921
California, used	2,500	2,500	2,490
Total	61,437	62,955	79,549
Stock of all sorts of lead in the United States, in first hands, January 1,'77			1,000
" " " " " 1,'78			6,000
Excess of supply over consumption in 1877			5,000

The above statistics are all in tons of 2,240 pounds.

THE IRON ORE BED OF THE MANHATTAN MINING COMPANY.—The *Amenia Times* says: "This bed ore is located near the northeast corner of the town of Amenia, N. Y., and near Sharon Station, on the Harlem railroad. The product of this mine is from 90 to 100 tons of ore per day, the company employing 90 men, whose wages aggregate about $2,800 per month. A notable feature about this mine is the ease with which the ore can be conveyed to the markets. It is hauled up from the mine in cars running on an inclined plane, by wire cables. The cars are carried up to a high platform, where the ore is washed, and dropped down into the railroad cars which stand on the track under the platform ready for the load. This is a side track from the Harlem road. The cars as they are loaded are moved on to the office, where they are weighed, and the next day are sent on to their destination to New York, or to Troy, etc. The water used in washing the ore is discharged into a flume which, being so much inclined, carries the 'slack' a safe distance out of the way, which is dumped into a pond called Chalk Pond, having its name from a layer of white shelly substance a little under the surface of the ground, which has scarcely lime enough in it to be called marl. In a few years the whole present area of the pond will be solid ground and good land, except where the dumping continues. A part of it was once a dangerous morass, which had an unknown bottom. The earth without ore, which is drawn up, is hauled away in carts with great facility, and deposited at a convenient distance, where there will be room for many years. About 200 cubic yards of earth per day is carried off in cars to the distance of 1,000 or 1,200 feet."

MINERAL STATISTICS OF ALGERIA.—The report of the Governor-General of the colony of Algeria states that "in spite of the crisis through which mining industry is passing, in consequence of the decline suffered by the prices of metals, and the general slackening of business, extraction continues to be carried on in Algeria on a large scale. The Soumah and Gouraya mines in the province of Algiers, those of Beni-Sof and Caramata, in the province of Oran, continue to equip themselves in view of a large production. At Ain-Mokta works are pushed with activity. The last-named group of working raised 65,000 tons of ore in its last business year (June 30th, 1876, July 1st, 1877), paying income tax on £89,080. At the silver-lead mines of Kefoun-Teboul, near La Calle, 12,173 tons of ore have been brought to bank in the same time. The zinc mine of Hammam N'bails, which now has the Bone and Guelma railway in its service, is equipped for an output of 10,000 tons per annum. Important deposits of zinc and lead have lately been discovered in the province of Alger, and will be worked by respectable companies. A company has been formed with the view of preparing poor ores before exportation with coal brought in ballast by ore ships. The idea is not a new one, but hitherto it has not been carried out successfully. The number of miners at work on July 1st last past was 3,639—380 in Algiers, 850 in Oran, and 2,401 in Constantine. This number is below the total of 1876. The exportation of ore in the first half of the present year was 255,213 tons, comprising iron, copper, lead, zinc, antimony, and chromium. The exports of ores in the same period of 1876 were only 237,438 tons. The present year therefore shows an improvement of 18,437 tons in quantity." Among other projects concerning Algeria, such as the creation of an internal sea by letting in the Mediterranean at Sahara, is one for building a railway across it, with a terminus at Timbuctoo. This will singularly aid in opening up Africa to the enterprise of Europeans.—*Iron.*

A HISTORY OF TUNNELING DURING THE THIRTY-FOUR CENTURIES SUCCEEDING THE REIGN OF RAMESES II.* — IV.

CANAL TUNNELS.

Canal building began in England by the construction of the Duke of Bridgewater's Canal, ten and a half miles long, from Worsley Mill to Manchester; built by James Brindley, engineer, and designed to afford a direct transport outlet from the duke's coal mines. The act of Parliament authorizing the construction of this work was passed in 1759, amended in 1760, and the first boat load of coal was taken over the Barton Viaduct on July 17, 1761. At Worsley, where a large basin was excavated of sufficient capacity to contain a great many boats, the canal did not stop, but entered the hill by a tunnel, the coal being directly shipped on the boats in the mines. This tunnel in Brindley's time was constructed about one mile in length, reaching to the different workings. It has since been enlarged with the mines, and is said in the aggregate to comprise over forty miles in all of subterranean navigation. These many canal passages, however, can scarcely be called *tunnels* in the general sense of the word.

The earliest tunnel proper on an English canal, and the second modern tunnel in point of date, was the Harecastle Tunnel No. 1, situated on the Grand Trunk Canal (Trent and Mersey), projected by Mr. John Grundy, in 1761; the tunnel itself being built by Mr. James Brindley. Work was begun in 1766, and the heavier portion was completed in nine years, though the tunnel was not finally ready for opening until 1777. It was 2,880 yards in length, 9 feet wide, and 12 feet high, and it would only permit a seven-foot boat, with a moderate loading, to pass. The passing was accomplished by leggers, so-called, a class of men who, lying upon their backs upon the freight, pushed against the sides and top of the roof with their feet, and thus moved the boat onward.

With this canal, tunnel-building on a large scale was fairly started in England; the canal was built largely in the interest of the Duke of Bridgewater, being commenced immediately on the successful completion of his first canal from Worsley to Manchester. The whole length was some 139½ miles, including the junctions with the Birmingham Canal and the river Severn; its object being to connect the Mersey with the Trent, and both with the Severn. Starting from the duke's canal at Preston on the Hill, it passed to a summit at the Harecastle No. 1 Tunnel, thence descending to the Valley of the Trent, which it followed to a junction with the Trent at Wilden Ferry. On the whole length of the canal, there were originally five tunnels: the Harecastle No. 1, 2,880 yards long, 9 feet wide by 12 feet high; Hermitage, 130 yards; Barnton, 560 yards; Saltersford, 350 yards; Preston on the Hill, 1,241 yards—the four latter all 17 feet 4 inches high and 13 feet 6 inches wide; and subsequently a sixth, the Harecastle No. 2, 2,926 yards long, built by Telford in 1824, and located parallel to and only 26 yards distant from No. 1. The similarity of name has caused some confusion, so in this work the author has taken the liberty of distinguishing them as No. 1 and No. 2. The second tunnel was built owing to the first being found too small to accommodate traffic, as, from the "legging" operation, it required some two hours to pass a boat through the old tunnel. The new tunnel was built 16 feet high and 14 feet wide, of which 4 feet 9 inches was occupied by the towing-path, leaving 9 feet 3 inches of clear water. The Rive de Gier Tunnel (1770), on the Givors Canal, the Torcy Tunnel (1787), on the Center Canal (both in France), were mentioned above; then came the Blisworth Tunnel (1798) in England, located on the Grand Junction Canal, 2,820 m. long. There were also a number of early tunnels built on the various mountain-passes over the Alps, constructed at periods from 1801 to 1830.

These early tunnels, however, were all through hard ground, and their method of construction was therefore much similar to drifting on a large scale. In 1798, however, the earliest proposition was made for that work, which first showed tunneling through soft ground (and in this case the very softest) was practicable. It was then that Dodd proposed the communication between Gravesend and Tilbury by a passage under the Thames. In 1802 Vazie projected a tunnel from Rotherhithe to Limehouse. The project of a tunnel at Rotherhithe was also agitated by Chapman in 1804, but it was not until 1807 that a company was formed and work started. In that year a shaft was sunk by Trevethick, and arrangements made to start the driftway, which was stopped in 1808 on account of an inflow of water; but the project was revived by Sir M. I. Brunel in 1823, who again started the work on the 1st of January, 1826. In 1827 it was again abandoned upon a second irruption of water. In 1835 the government made some advances of money, and the work was resumed in March, 1836, with a new shield. The water again broke in on June 11, 1836, and stopped the work for six weeks, after which it was pushed steadily to its conclusion in 1842.

We must not here forget the Tronquoy Tunnel, on the St. Quentin Canal, in France, built through sandy ground in 1803; for, though the Thames Tunnel was proposed in 1798, we have seen that work on the one finally completed was not actually begun until 1807, so that the Tronquoy Tunnel was in fact the earliest tunnel built through ground requiring arching; but owing to its prominence, the Thames Tunnel probably exerted greater influence on the subsequent history of tunnel construction.

It is also of interest to note that it is said that at Tronquoy a steam engine was already in use in 1803. Starting almost simultaneously with the Tronquoy Tunnel was built the Riqueval Tunnel, also in 1803, on the same canal, and later also in France the tunnels of Noirieu, on the St. Quentin Canal (1822), St. Aignan (1822), Pouilly, on the Bourgogne Canal (1824), and then the Harecastle Tunnel No. 2 (1824), on the Grand Trunk Canal (Trent and Mersey), England, cited above.

In 1856 there were in England over 45 tunnels on the various canals, aggregating some 219,827 feet (67,000 meters) in length, and in France about 20, of a total length of 28 500 meters; among them the Noirieu Tunnel alone was some 12,000 meters long; also, among the earlier tunnels of the century may be cited one on the Carlsgraf Canal, in Sweden, and another on the Castile Canal (6,000 meters long) in Spain.

From the very beginning of tunneling Rziha has traced the development of the several systems of tunnel construction now in vogue in Europe, and which will be elaborated in the following work, under the heads of the English, Belgian, German, and Austrian systems. The English, adhering to the example set in the Thames Tunnel, take out the full cross-section at once: the Belgians followed the principles of the tunnel built in 1828 on the Charleroy Canal; the Germans, the system originally developed in the tunnels of Tronquoy and Pouilly, and advocated by Wiebeking in 1814, as following the center-core system also in use in the construction of the broad Bavarian beer cellars. This center-core system has been fixed in its distinctive nomenclature as the German system, but De Bauve, in the treatise on tunneling in his *Manuel de l'Ingenieur*, has claimed it as the "French system," and it would seem with good reason, as it is admitted to have been devised and first put in execution by French engineers on a French tunnel (that of Tronquoy). The Austrians finally developed a plan corresponding to and based on the timber system in vogue in the Freiberg mines, and first applied by Meixner in the construction of the Oberau Tunnel in Saxony (1837), and by Keisler at the Gumpoldskirch Tunnel, near Vienna-Neustadt, in Austria (1839).

RAILROAD TUNNELS.

The first tunnel built on a horse-railroad (according to Rziha)* was the Terrenoire single track, near St. Etienne, in France, on the Roanne-Andrézieux horse-line, begun in 1826: 4,921½ feet (1,500 m.) long, 9·8 feet (3 m.) wide at springing line, and 16·4 feet (5 m.) clear height. In the Bulletin No. 5 (1856) of the *Corps des Ponts et Chaussees*, p. 5, there is also mention of a "Terrenoire" tunnel, 1,499 m. long, which, with some 14 others, was built on the road from St. Etienne to Lyons in 1828–33; in this reference the tunnels of *Neaux on the Andrezieux-Roanne Road* are also referred to as preceding steam railway tunnels. The first tunnels on a railroad on which locomotives were used were the two constructed on the Liverpool & Manchester railroad, which was commenced by George Stephenson in 1826, and opened to traffic in 1830, though it was in October, 1829, that the memorable trial between the "Rocket," "Novelty," and "Sans Pareil" locomotives took place on this road. The first locomotive was used in England on the Stockton & Darlington line, opened in 1825.

In this connection it is hardly necessary for us to touch on the early days of the steam engine.† It may be well, however, to recall the leading dates pertaining to its history. The steam engine was of slow development. For a century and a half it had been experimented upon: by the Marquis of Worcester, to elevate water at Vauxhall, in 1656; by Pepin (who appears to have been the inventor of the principle of the safety valve), in 1680; by Newcomen and Cawley, who completed an engine in 1710; by Savary, a Cornish miner, who constructed one to pump water from a mine in 1718; and by James Watt, who, about 1770 succeeded in bringing it to something like perfection. This new power had been utilized on land and water. It had been made to assist the miners, to drive machinery, and to propel boats. The records of the province of Catalonia, in Spain, prove that, in 1543, Blasco de Garay, an officer in the service of the Emperor Charles V., made an experiment at Barcelona with a vessel which he forced through the water by means of steam generated in a large kettle.‡ While his experiment was successful, the results were not practically applied, and the matter was soon forgotten. Other experiments followed during the next two hundred years in different parts of Europe. Finally, in 1775, John Fitch, a citizen of Bucks County, Pennsylvania, a watch and clock maker by trade, commenced experimenting on the subject. He appears to have had no knowledge of even the existence of such a thing as the steam-engine, and he made everything he needed as his experiments progressed, and in 1787 he actually completed, in all its details, a steamboat, with which he navigated the Delaware River successfully. Instead of paddle-wheels, the steam power was applied to a number of oars, which worked upon either side of the boat in the ordinary manner. David Rittenhouse, the astronomer, certified, in December, 1787, that he had frequently seen Mr. Fitch's boat, and had been on board when it was "worked against wind and tide with considerable velocity by the force of steam only." Fitch continued his experiments, and, in 1790, advertised to carry passengers regularly to and from Burlington, Bristol, Bordentown, and Trenton, on the Delaware. The boat at that time ran, on an average, seven and a half miles per hour. Fitch, however, was in advance of his times; money was wanting to carry his project to full development and fruition. Finally, disheartened and impoverished, he became a wanderer over the world, and at last committed suicide in Kentucky, where his remains rest in an unmarked and almost unknown grave. In 1807, Robert Fulton, to whom the credit of inventing the steamboat is generally attributed, perfected his steamboat, and tried it upon the Hudson. His first attempt was made upon the Seine in 1803.

THE CARBONATE MINES OF CALIFORNIA GULCH.

Staff Correspondence of the Engineering and Mining Journal.

I closed my last correspondence on the road between Fairplay and this point, a well considered halt, for the connection between the two places is a Pass rising nearly a thousand feet above timber line, and I know of but few incidents to be met with in the journey of life, that will so chill the soul of the traveler, or dampen the ardor of a correspondent, as a trip across the Snowy Range a few days before Christmas, especially when alone, and on the back of an animal which only resembles a horse when viewed from some distant point.

In a direct line, Leadville is about 18 miles due west from Fairplay, and on the opposite slope of the Mosquito Range. By the Western Pass it is 40 miles. The St. Louis Smelting Company built the summit section of this route, which before this season has only been passable by a trail. The road is well made, and the grade, except at a couple of points on the western slope, quite fair. Descending, one reaches the Arkansas Valley, which, if followed up for a few miles, brings the traveler to the mouth of California Gulch, and within the limits of the town of Malta.

Sixteen years ago, this gulch was infested with a stirring population of four or five thousand miners. The creek bed in a couple of years yielded nearly $5,000,000 in gold dust, and in one claim, about 2 miles below the town of Oro City, which stands at the head of the gorge, $110,000 was taken out in a couple of months. It was the most productive gulch in the State, but, as soon as rifled of the best of its gold, became, as usual, almost deserted. Two mines, the Printer Boy and Pilot, represented nearly all that was left, and, though the former for a number of years has been worked with more or less success, it has yielded no profits since 1873. It was noticed by the miners in 1861 and 1862 that the gravel and boulders of the gulch were unusually heavy, but no explanation was given of the occurrence. In drifting up the channel, regular courses of this heavy gravel and rock would be encountered, having the appearance nearly of veins, but, as no gold was found in prospecting the out-crops, no further search was made.

About two years ago Mr. A. B. Wood, of Ann Arbor, Michigan, first detected the presence of carbonate of lead in these heavy stones. Further prospecting on the hillside gave indications of the existence of deposits of this valuable mineral in place, and on sinking shafts a stratum of lead ore was found, which varied in thickness from 5 to 20 feet, and carried both silver and gold. This discovery was hardly a month old before the hillsides were covered with prospectors. Indications of ore were found in every direction, but as there

* Extracts from advance proofs of *A Treatise on Tunneling, Explosive Compounds, and Rock Drills*, by Henry S. Drinker, Mining and Civil Engineer. Published by John Wiley & Sons, New York. (Copyrighted.)

* *Eisenbahn-Unter- und Oberbau*, page 335.

† See Prof. R. H. Thurston's *History of the Steam Engine* (now 1877 in press) for the best elaboration of this subject.

‡ Wm. P. Sipes's *History of the Pennsylvania Railroad*, Philadelphia, 1875, p. 2.

was no out-crop shafts had to be sunk. Both time and money were therefore needed to open the camp. Fortunately the latter was not wanting, and as a result the same class of ores was shortly found at various points in the vicinity of the gulch, both north and south, for a distance (total) at present of about 6 miles.

The geology of the district is very complex, and so little has been done in the mines that but little information is to be gained by an examination of them. The deposits appear to exist on three levels or horizons. The upper is opened most extensively in the Long and Deery mine, on the Divide between Empire and Iowa gulches. The second is shown in the Rock, Iron and Gallagher mines, the third in the Hallett and Cooper. The mineralogical character of all being similar, and the inclosing rocks the same so far as known, there is but slight doubt that one and all were deposited at the same time, though between the Hallett and Cooper and Long and Deery mines there is an interval of certainly 1,500 vertical feet. What is known of the geology of these deposits is as follows: Almost the entire country is capped with porphyries of all varieties. Directly beneath these are found the metamorphic limes and schists, which are plainly noticeable on Mounts Lincoln and Bross a few miles off to the northwest. Underneath these are the Silurian quartzites, which, as shown in places both north and south, repose on gneiss and granite. Out-crops of the Azoic rocks are, however, not to be found within a distance of at least 10 miles. The sedimentary rocks appear faulted very extensively, and in addition have been subjected to very heavy erosion. So enormous are the areas of porphyritic overflow that the conclusion is forced that great and eruptive force must have been at work in the past.

If a theory of the case is allowable upon the basis of the very scanty material as yet on hand, a very simple one presents itself, and will find, I think, many points in its favor. As is well-known, the Park Range is of recent origin, far more recent than the Sawatch Divide, which forms the west wall of the Arkansas Valley, and the granite mountains, which, spreading to the north and south from Pike's Peak, form the southern and eastern boundaries of the South Park. This being admitted, it will not be difficult to find many indications showing that the Park and the Arkansas Valley were once joined in one vast basin, with its main outlet through the Grand Canon, above Canon City, the other being the South Platte, which debouches from the mountains about 20 miles south of Denver. At the elevation of the Park Range, which, from the condition of the rocks and their numerous faults, must have been sudden in the extreme, the sedimentary strata were tilted east and west, and the whole country for a distance of ten or twelve miles on either slope of the central upheaval deluged with volcanic overflows, which intruded themselves between the limes, sandstones and shales wherever opportunity was afforded. Subsequent erosion and disintegration has altered the face of the country enormously. On the eastern slope the metamorphosed Silurian rocks have been extensively destroyed near the Range, leaving the more recent deposits which now exist in the Park, in the lower altitudes. On the other side, every thing down to the Silurian appears to have gone. An examination of the crest of the Park Range, from its summit at Lincoln for a distance of 30 miles south, shows the highest points to be uniformly capped with porphyry. Under these the crystalline limes and shales are found, inclining in some places eastward, and in others westward, and in one or two places showing the perfect saddle.

Unfortunately, however, for a theory of this nature, while it conforms admirably to the facts so far as known, it furnishes no explanation of the extensive carbonate deposits in California gulch, an acre of whose sands is worth more than all of the geology of the State. This is the question of the day in the "gulch," and the answer may not come until the hills have been pierced by thousands of feet of shafts and tunnels. Still there are some conclusions which may be drawn from this theory which have possibly some value. And, first, let it be stated that these deposits occur in a majority of cases just below the porphyry, and are underlaid by limestone. In every case I have seen, a section from the surface to the rock underneath the ore has been substantially as follows, beginning at the top:

1. Porphyry, 12 to 100 feet thick.
2. Soft white clay, 0 to 3 feet thick.
3. Carbonate of lead of every variety, 1 to 20 feet.
4. Oxide of iron, 1 to 6 feet.
5. Limestone.

If, now, it be correct that the three series of carbonate beds already spoken of are in reality but sections of one and the same stratum, it follows that the lower two, after being explored to a certain distance, will be found to abut directly against the line of the fault. In such a case, we should need at least a dozen new amendments to our mining law to cover the circumstance.

Secondly, the upper line of deposits, which are presumably in place, since nothing has been found above them, may be safely calculated to hold on until the eastern slope of the range is reached, when owners will have to hunt for the continuation of their bonanzas, with all their dips, spurs, angles, and litigations, underneath the unchanged sandstones and limestones of the Park.

Thirdly, the deposit is not, under any circumstance, a vein in the ordinary sense of that term, nor a contact lode. In every way, it corresponds to deposits of bog iron ore, is likely to be very extensive, will most probably, as soon as explorations are sufficiently pushed, assume an upward rather than a downward pitch, and lead ultimately to beds of pyritous slate, rich in gold, overlaid by bedded veins of argentiferous galena, or segregations of the same mineral in limestone, similar to those of Mounts Lincoln and Bross.

I have not by any means exhausted the geology of the subject, but it is perhaps best to lay that wonderful and elastic science aside for a while, and examine these deposits from a somewhat more practical and satisfactory point of view. Until quite recently, whenever a citizen of the gulch felt the need of a carbonate mine, he went up on the hillside without any particular reference to any surface indications, excepting the survey stakes of some other mine, and commenced the sinking of a shaft. By general consent among the miners, who immediately saw that no section of our mining law could by any possibility be construed to cover and hold deposits of this nature, each prospector was given the right to hold ground showing no outcrop, so long as he prosecuted work upon it. In sinking, after due time the porphyry would be passed, and if ore was found a claim was staked out in any direction to suit the convenience of the explorer. If the ground proved barren, a new location would be selected, as the taste of the miner suggested. This plan would be persevered in until either ore was found or the carbonate hunter passed quietly into bankruptcy. In a majority of cases, however, ore would be found in at least the second shaft, and as a consequence the hillsides around California Gulch are to day fairly shingled with claims, so that there is scarcely a patch of vacant ground in the district. Generally, ore has been reached inside of 100 feet, and in masses extending horizontally in every direction, having a thickness from 6 inches to 20 feet. All varieties of oxidized lead minerals occur, but the carbonate and sulphate preponderate. In places it is a compact gray rock, very heavy and solid; in others, a thick seam of gray-yellow mineral, cutting like cheese under the pick; in others, showing seams of dark gray mineral running through it. The first mentioned will mill, as taken from the mine, about 65 per cent. of lead and 10 to 20 ounces of silver. The second will carry nearly as much lead, and about twice as much silver. The third, while also assaying high in base metal, mills from $150 to $2,000 per ton in precious metal, oftentimes carrying from a half to two and three ounces of gold. Of course the quantity of the first two classes is vastly greater than that of the latter, but there is certainly a larger percentage of high grade lead ore in this camp than in any other in the West. Moreover, in the few mines already opened so much ore is exposed that a 20-ton furnace could be supplied for a couple of years without another foot of development.

The following report of the more prominent mines will give a fair idea of the condition of the district.

Rock Mine.—Stevens & Leiter, opened by both shaft and tunnel; ore body 5 to 25 feet in width, carrying besides an enormous body of low and medium grade, a good seam of higher class.

Snuggler.—Just struck in shaft at depth of 60 feet, ore 2½ feet thick.

Iron Mine.—Of the same nature as the Rock, also same owners.

Campbird.—Opened by incline over 200 feet. The body of mineral is continuous in every part of this mine, and ranges in width from 1 to 9 feet, averaging certainly 4 feet throughout the incline. Grade rather high.

Adelaide.—Same state as Campbird, and similar in every respect, though not opened so extensively. Adjoins the latter.

Pine.—Ditto, ditto.

Morning Star.—Shaft 90 feet. Have just struck a narrow seam of ore.

Evening Star.—Practically similar in all respects to its Morning contemporary, which it adjoins.

Catalpa.—Shaft 55 feet. Large vein of low grade ore at bottom, with a narrow seam of first class. Drifting east on the vein.

Crescent.—Shaft 40 feet. Vein of high grade ore 5 feet in thickness throughout the workings. Drifting east. This claim has recently produced ore carrying chloride of silver.

Yankee Doodle.—Shaft 28 feet. Ore vein of moderate grade from ½ to 2 feet in width.

Hallett & Cooper.—Shaft 35 feet. Ore 3 to 5 feet, producing considerable, which is worth $300 to $600 per ton.

There are parts of others nearly all showing ore of some grade or other, but an attempt to describe them would be wearying, for they exhibit no material difference except that of name. The Long and Deery mine, already spoken of, is included in the list of the finest, and is probably the equal of any. Altogether in the camp there are at present about fifty mines being worked and producing. At least four of the mines are capable of turning out thrice the ore they can dispose of with the limited market in the gulch. A number of others will doubtless be in the same condition by spring.

The St. Louis Smelting and Refining Company were the first capitalists, except the owners of the Rock and Iron Mines, Messrs. Stevens & Leiter, to appreciate the true value of the district. Early this year they began the erection of a smelter of a capacity of 20 tons, which went into operation November 1, and has been turning out 4 tons of base bullion daily since that time. Details in full of the working of this establishment were not accessible. It is intended merely to smelt the lower grades of ore, which were stated to carry about 50 per cent. of lead and 30 ounces of silver per ton. The resulting base bullion was said to run from 60 to 100 ounces in silver. The capacity being 20 tons, and the output 4 tons, there would appear to be some discrepancy in the figures which is hardly reconcilable. It is due to the company, however, to state that as yet they have hardly got into working order. Being until quite recently the only purchasers of ore in the gulch, their floors are crowded, and their capacity, patience, and time taxed to the utmost. Appended to the works is a crushing and sampling establishment. All ore worth over $75 per ton in silver is sacked and shipped to St. Louis.

Within the last two weeks Messrs. Berdell & Withwell have opened a sampling works at Malta, and are shipping from twelve to twenty-five tons weekly, of high grade ore, to the Omaha works. In the spring they will put up a furnace.

The St. Louis Works are using coke made from Trinidad (Colorado) coal, and find that it answers excellently. A large proportion of charcoal is mixed with it. The coke costs $13 per ton at Colorado Springs, from which point it is freighted through the park to the mines in mule teams, a distance of about 120 miles. The cost of transporting the bullion from the furnace to St. Louis can hardly be less than $40 per ton.

A visit to this now noted camp cannot fail to impress one with the belief that its prosperity is assured. The amount of ore of a grade that can be profitably handled, even at the present price of lead, is very large, and will rapidly increase in quantity. In spite of the phenomenal nature of the deposits, they will not be exhausted for many years, nor is it likely that changes will occur in the character of the ore for a long time. It is certain also that much remains yet undiscovered. Already the same belt has been found to exist in the mountains around Tennessee Park, six miles north, and prospectors are meeting with some success in tracing its continuance southward and eastward. It is thought that its course crosses the Park Range, in the vicinity of Weston Pass, and that the proper search will reveal carbonates on the western edge of the Park, and in localities much more accessible than those now being worked. Another season will, without doubt, afford a host of new discoveries of the most valuable character. Meanwhile the mines already found and opened are themselves, and alone, of worth and extent enough to build up a large community.

LEADVILLE, COLO., Dec. 23, 1877.

MANUFACTURE OF FERROMANGANESE IN THE BLAST-FURNACE AT TERRENOIRE.

M. Pourcel, the manager of the blast-furnace and melting departments at Terrenoire—to whom is due the process of producing rich ferromanganese in the blast-furnace (a process that has been in operation at these works for a period of nearly three years), and also, more recently, the alloys of silicon, iron, and manganese, which form the essential feature in the manufacture of steel without blowholes, a subject which was fully treated by M. Gautier in his paper read at the London Meeting of the Iron and Steel Institute, in March last, has just communicated a note on the "Manufacture of Ferromanganese," to the Societe de l'Industrie Minerale, at St. Etienne, of which the following is a translation:

On exhibiting some specimens of ferromanganese containing 81 per cent. Mn, M. Pourcel said:

"The blast-furnace in which was produced this alloy, which is the richest in manganese that can be obtained even in a crucible, on anything like a commer-

cial scale—its chemical formula being represented by Mn_5FeC_2—yielded on a Bessemer burden about 42 tons pig iron per 24 hours, with a consumption of 19 cwt. of coke containing 15 per cent. ash, per ton of pig produced; the blast being heated to 750° Centigrade.

"On August 20, the mean temperature of the blast being 715° Centigrade, this furnace was making ferromanganese of 72 to 74 per cent. (an alloy that has been regularly made at Terrenoire for the past two years) from ores containing 36 to 40 per cent. manganese, some being of a silicious, others of a calcareous nature, at the rate of from 11 to 12 tons per 24 hours.

"Of the total manganese charged into the furnace, at least 65 per cent. is utilized, the yield of fuel being 55 cwt. of coke to the ton of metal.

"From August 20, at 6 P. M. to 2 P. M. on the following day, the furnace received thirty charges of a burden calculated to yield ferromanganese containing 81 per cent. manganese; 60 per cent. only of the manganese in the charge being utilized, and the consumption of fuel amounting to 3 tons of coke to the ton of metal.

"The driving of the furnace was the same as for 74 per cent. Temperature and pressure of blast being unaltered. The cast at 10 P. M., on August 21, yielded 77 per cent.; that at 6 o'clock on the following morning (the furnace was tapped at intervals of eight hours), 79 per cent. manganese; and eight hours afterwards a cast of 3 tons 16 cwt. contained 81 per cent. The following cast gave 79 per cent., and the percentage then decreased to 77, and finally to 74 per cent., as before.

"The alloy containing 81 per cent. appears to be much more refractory than the 74 per cent. It would require a large excess of heat for its production to prevent the metal setting in the hearth—say, at least, 66 cwt. of coke per ton, so as to utilize from 65 to 70 per cent. of the manganese of the charge, with a make of 10 or 11 tons per 24 hours.

"The slag corresponding to the 74 or 81 per cent. has a constant chemical composition. It flows freely from the furnace, the surface being of a light green color, and the fracture presenting a stony appearance. It is perfectly infusible in the open air.

"FERROMANGANESE.—Analysis of the manganese gave the following results:

Manganese	81·242
Iron	12·000
Carbon	6·600
Silicon	0·093
Phosphorus	0·300
	100·235."

PARTICULARS OF PROF. SCHIRMER'S DEATH.

Colonel E. P. Jacobson lately received a letter from Mr. Balbach, recently of Denver and now of San Francisco, detailing the circumstances of the death of Professor J. F. L. Schirmer, from which the following extract is made:

"On Thursday, the 13th of December, Professor Schirmer complained of a pain in his chest, which afterward extended to the arms and shoulders. On Sunday morning he sent for a physician, who stated that it was nothing but a rheumatic attack; in the evening he felt much easier. After midnight Mrs. Schirmer woke and found him in a perspiration; he said he felt chilly but otherwise easy. A few minutes afterwards a few stifled shrieks escaped him, and when Mrs. Schirmer got up to turn on the light and went to raise him, he only breathed two or three times when he expired. The supposition is that he died of either a congestive chill or rheumatism of the heart. His remains were brought on Tuesday by Mrs. Schirmer to San Francisco, and were to have been buried by the Masonic fraternity on Sunday, the 22d inst.

"A number of Professor Schirmer's friends in Denver wrote to Mrs. Schirmer requesting her to bring his remains to this city for interment, but it seems that she has decided upon another course. The telegraphic announcement of the Professor's death has caused very general grief. He had a large circle of friends, and no man ever resided in Denver who was more warmly esteemed than himself. He came to this State about 1866, and first established himself in Georgetown as an assayer. He succeeded Mr. Lane as assayer in charge of the Denver mint. He received his education at Freiberg, in Germany, and was a thorough scholar. The greater portion of his life was spent in mining and assaying. When he first came to America, he went to Mexico, and assisted in developing the rich mines in the western portion of that republic. He also spent some time in South America, and was awhile, previous to his coming to Colorado, in California. When he left Denver last spring he was under engagement by a California company to go to Mexico as an expert to examine mines there for the company; but the company became disorganized, and he entered into partnership with an old friend to operate mines belonging to the latter in Placer County, California. There he died. The deceased was about forty-eight years of age."—*Denver Tribune.*

PITTSBURG'S PROSPECTS.

If most of the readers of the JOURNAL were asked the question "For what is Pittsburg chiefly noted?" they would probably answer "riots," for so much has been said by the newspapers throughout the country concerning the "little unpleasantness" which happened here last summer, and so little has been said concerning the industrial interests of Pittsburg, that it might almost be forgotten that she is one of the principal manufacturing cities of the world. We have heard of the Pittsburg of the South, of Chattanooga, of the Hocking Valley, and other localities whose youthful dreams of rivalry with old Pittsburg have been published far and wide, and the decay of the latter has even been hinted at.

There have been some foundations for the rumors of the decay of this once renowned city. She has had disadvantages to contend against, although they were artificial rather than natural. The chief of these is perhaps railroad discrimination. Other cities with far less natural advantages have been favored to the direct injury of Pittsburg, because they happened to have competing railroads. The whole of the West at one time, it seemed, preferred to buy goods from east of the Allegheny mountains, and especially from New York, rather than from Pittsburg, simply because freights from New York were cheaper than freights from Pittsburg. We have heard of iron being shipped from the Hudson River to St. Louis at a lower rate of freight than it could have been shipped here. Another disadvantage of the city is lack of water transportation, excepting for a few months in the year. Her shipping lies idle for about half of the time, to the harm both of the shipping interest and of general business. The conservatism of her citizens has also worked against her. Years ago, Pittsburg leaped into the foremost rank as a center of the iron, steel, and glass industry. Her immense natural advantages helped her retain her foothold. Her citizens became wealthy and contented, but conservative—almost "old fogy." She grew in population of course, but St. Louis, Chicago, Cincinnati, and Cleveland far outstripped her. Cleveland, with no natural advantages over Pittsburg, took her petroleum trade. Cincinnati, hampered like Pittsburg by want of sufficient railroad facilities, built a railroad at a cost of $16,000,000, while Pittsburg merely growled at "discrimination," and spent the money she should have built a railroad with, in paving streets, *a la New York*, and in building fancy water works at fancy prices. St. Louis and New Orleans have secured an outlet to Europe through the Eads jetties, while the improvement of the Ohio River navigation is merely talked of, and even opposed by many of her wealthiest citizens—the coal men.

Pittsburg does not advertise herself extensively. She seems to expect business to come to her without going out to seek it. She exhibited at the Centennial of course, because she is patriotic, but only a few of her manufacturers will exhibit at Paris, which would be of more benefit to them. There was an industrial exhibition held here during the fall, and if it was a success, it was only on account of the energy of its board of managers, who drew a big attendance from the surrounding country by offering cheap excursions on the railroads, and not on account of the excellence of the exhibition, for it was only grudgingly patronized by home exhibitors, whose displays were few in number and tame in appearance. Philadelphia is doing wonders in endeavoring to establish a South American trade. Pittsburg's efforts in the same direction consist in seven houses sending *one* agent to Brazil! Printer's ink is used but sparingly, and if a Western buyer on his first visit to the East knows, as his train passes through a dense cloud of smoke, which the conductor tells him is Pittsburg, that here is the place to buy good iron at the lowest price in the country, it is because he has learned it by some other means than by reading about it.

But as above stated, the disadvantages under which Pittsburg labors are all artificial and not natural. They will be cured before long, and her natural advantages will keep her for an indefinite time to come the center of the iron industry of America. Three new railroads are now being built, two, the Pittsburg and Lake Erie, and the Pittsburg, Newcastle and Lake Erie towards the north-west, and the third, an extension of the Pittsburg and Castle Shannon, southward into Virginia. The improvement of the Ohio River is only a question of time, as is also the dying out of the "old fogies."

In another letter, the natural advantages of Pittsburg may be discussed more in detail, when it is hoped it can be shown that there is not the slightest reason to fear the "decay" of Pittsburg, but that, on the contrary, she has a future which will astonish those who have so long been belittling her. W.

MINING NEWS.

Staff Correspondence of the Engineering and Mining Journal.

COLORADO.

A rich strike of telluride ore is reported to have been made in the Kearns lode, Gold Hill, quite close to the noted Melvina.

At Rosita the prospect for the new year is most encouraging. The Humboldt is shipping considerable ore to Blackhawk, in addition to the low grade rock handled in its own mill. The latter is being doubled in its capacity. An additional cylinder is being erected, and a new battery of stamps, which will make ten heads in all. The mine is employing 40 men, and stacking up large quantities of low grade mineral. The company propose to buy custom ores in the future, and will pay Black Hawk prices, less freight.

The Pocahontas is idle, owing to the recent unfortunate litigation into which it has fallen.

The Maine mine, the phenomenon of this district, and in many respects one of the most remarkable mineral deposits in the West, is sunk upon to the depth of 120 feet and still shows plenty of ore. In fact the shaft is in the ore, being bounded on all sides by the deposit. This deposit occurs on the summit of a hill which rests on the slope of Tyndal Mountain. The outcrop is contained in a circle about 30 feet in diameter. It has no length as in a lode. The country rock, which is porphyry, rises on all sides apparently towards the mouth of this chimney. The shaft was sunk directly in the ore which carries both gold and silver, with a preponderance of the former. A recent mill run showed 19 oz. gold, and 39 oz. of silver. No diminution of the ore body is apparent so far, though no levels have been run, the large shaft producing all that the owners care to sell. The ore is a dark, flinty quartz, stained occasionally with iron, and carrying besides free gold, some silver glance, and gray copper. Tellurium is said to have also been found.

The Polonia, Columbus, Franklin, Tecumseh, Poorman, Elizabeth, and Leavenworth are all producing more or less, while active developments are being pushed on the Victoria, Lucille, Delmote, and Four Aces. Baugh & Co.'s lixiviation works are now in operation.

The survey has been completed for a new ditch from Ten-mile creek to bring 1,000 inches of water to the Izzard Placer Mine, Blue Valley. Its length will be four miles.

The Old Pay streak, which ran through Jeff Davis Patch in French Gulch, and yielded one and one-fourth millions within a very short distance, is said to have been found again in a patch farther up the gulch. The discovererf is taking out an ounce of gold per day per man with a rocker during the present season.

The fires have been lighted in the furnaces of the Trenton Dressing and Smelting Works at Golden. A large quantity of ore is on hand, and the works will be in full blast in a short time.

The production of coal in Colorado during 1877 has amounted to about 150,000 tons. Of this amount about 70,000 tons was from the Southern mines, and 80,000 from the Northern. Coke is now being made successfully and in large quantities from the Trinidad coal.

MONTANA.

The Hope Mining Company (Phillipsburg) shipped $23,000 in silver bullion during November.

The Butte shipments of silver for the week ending December 24 were $19,084.

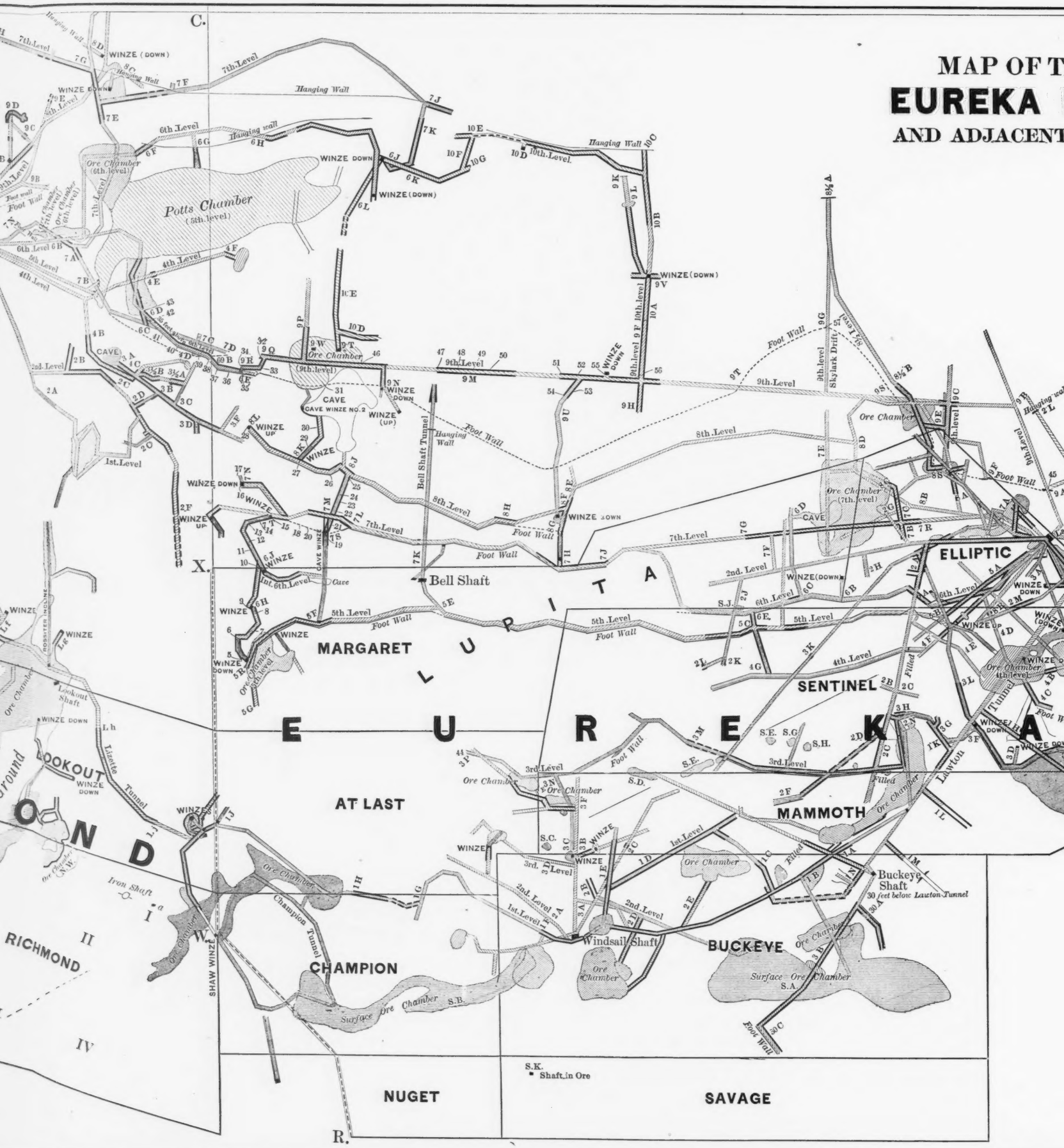
NEW MEXICO.

The Colfax Company mines (placer), and located mostly on Ute and Moreno creeks, produced last year, according to Secretary Rich of New Mexico, $225,000 in gold dust.

NEVADA.

On the last day of the year, 1877, the heaviest bullion shipment ever made in a single day from any mine was made from the Bonanza. It amounted to $1,100,000.

The December shipments of the Manhattan Company (Austin) amounted in value to $84,900.



MAP OF THE EUREKA MINE, AND ADJACENT MINES, NEVADA.

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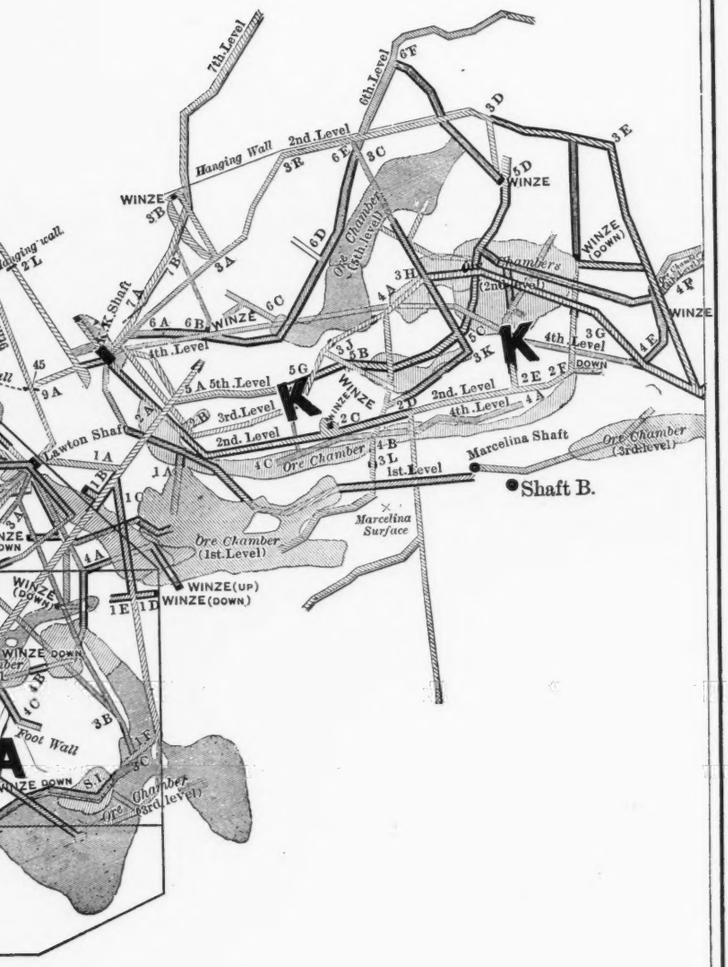
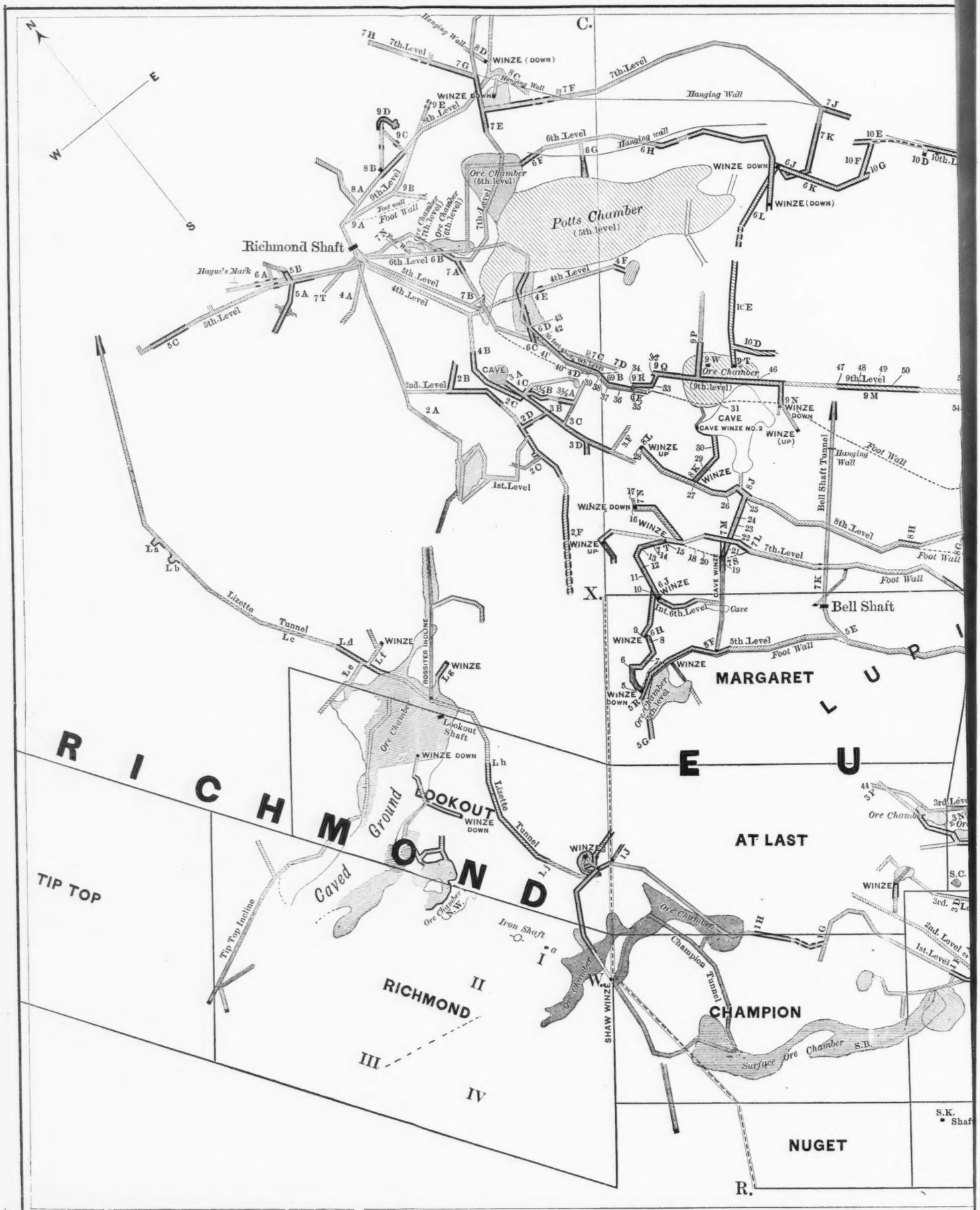


SCALE OF FEET

0 40 80 120 160 200

Russell & Struthers, N.Y.



MAP OF THE EUREKA MINE, A

THE EUREKA LODE, OF EUREKA, EASTERN NEVADA.*

[WITH SUPPLEMENT.]

By W. S. Keyes, of San Francisco, Cal.

(*Concluded from page 25.*)

THE CLAY SHALE.

Bounding the vein limestone on the north, and marking the limits of mineralization of the zone, we find a distinct line of calcareous and argillaceous shale. This shale has been uncovered in the deep workings in the Jackson, and both on the surface and in the lower levels of the K.K., Eureka, and Richmond claims. It has been traced in the K.K., on the third and fourth levels, a distance of nearly 200 feet in each; on the tenth level of the Eureka about 200 feet, and for a considerable distance on the seventh and eighth levels of the Richmond.

Its general course where exposed, after leaving the Jackson, is more or less nearly ten degrees north or south of an east and west line. Its dip is much steeper than the average dip of the quartzite, varying from 80 to 85 degrees It is plastic, with a slightly greasy look, and in color greenish or yellowish, like a talcose mineral. Although containing iron it is never reddened.

We have three analyses, Nos. XV., XVI., and XVII., of this material, made by Professor Price, as follows:

	XV.	XVI.	XVII.
Carbonate of lime	66·92	10·29	26·12
Carbonate of magnesia	1·96	0·75	1·05
Carbonate of iron	5·82	6·09	17·50
Alumina	traces	traces	traces
Silica and silicate of alumina	24·81	82·21	54·50
Totals	99·51	99·34	99·17

No. XV. was a sample taken from the Bell shaft tunnel.

No. XVI. was a sample taken at the foot of the seventh level of the Richmond.

No. XVII. was a sample taken from the face of the eighth level of the Richmond.

Judging from these analyses, the shale is simply an argillaceous material, more or less mixed with carbonate of lime. The shale at the Bell shaft tunnel is within a very few feet of the surface, and seems to carry much less silicate of alumina than samples taken from the Richmond at points 700 and 800 feet beneath the surface. The percentages of clay are, however, amply sufficient to identify all three samples, and to distinguish them from the vein limestone.

EXTERIOR LIMESTONE.

Beyond the line of clay shale to the north we find a second body of dolomitic limestone, which forms the hanging wall country. This is distinguishable from the vein limestone from the fact that it contains no ore, no caverns, and no ore stains, or oxide of iron, except at two isolated minor localities. Near the surface it is apparently unstratified, or shows very faint signs of stratification. Beneath the surface, on the contrary, is it generally very plainly stratified, and has its lines of bedding resting upon and dipping slightly towards the clay shale.

The stratified country limestone can be seen to the best advantage at the Jackson Mine. This company's new main shaft was located at a point several hundred feet north of the quartzite outcrop, and was sunk a distance of 460 feet, all the way through distinctly stratified country rock. At the depths of 300 and 460 feet, levels were driven off to tap the vein. Both of them passed through the stratified limestone, cut the clay shale hanging wall, and passed into the metamorphosed unstratified vein limestone, through which they advanced to the quartzite footwall.

We have three analyses of this material, by Messrs. Luckhardt & Huhn, marked Nos. XVIII., XIX., and XX., which prove it to be a typical dolomite, as follows:

	XVIII.	XIX.	XX.
Carbonate of lime	52·01	54·34	54·76
Carbonate of magnesia	43·88	43·49	39·66
Alumina and oxide of iron	1·13	0·37	1·74
Silica	0·50	1·79	1·00
Water	0·09	....	0·12
Alkaline carbonates and loss	2·39	0·01	2·72
	100·00	100·00	100·00

No. XVIII. was taken 30 feet north of the clay shale, in the Bell shaft tunnel.

No XIX. from a point 120 feet north of the clay shale, in front of the Bell shaft tunnel.

No. XX. in the third level of the K. K., on the main drift easterly from the shaft, from a point about six inches to the north of the clay shale hanging wall.

We have also some analyses made by Prof. Price, marked Nos. 21 to 27, both inclusive, as follows:

No.	Carbonate of Lime.	Carbonate of Magnesia	Carbonate of Iron.	Alumina.	Silica and Silicate of Alumina.	Total.
21	58·24	37·80	1·32	1·02	0·63	99·01
22	68·23	27·46	2·32	traces	0·92	98·93
23	52·92	34·48	3·62	traces	10·15	99·17
24	88·34	4·98	1·59	traces	4·83	99·74
25	91·62	1·21	1·59	traces	4·73	99·14
26	88·21	1·36	2·32	traces	6·12	98·01
27	92·60	2·95	0·87	traces	1·62	98·04

No. 21 was taken on the northern side of the hill, very near the mouth of the Bell shaft tunnel; No. 22 from inside the Bell shaft tunnel; No. 23, from a small shaft between the Bell shaft and the main Richmond shaft; No. 24, a sample of the stratified limestone taken from a point 20 feet from the end of the seventh level of the Richmond mine. No. 25 was a sample of the stratified limestone taken from a point on the eighth level of the Richmond mine near the line of contact with the shale; No. 26, from a point near the Richmond Boarding House, on the northwesterly side of the hill; No. 27, from a point on the southwesterly spur of Adam's Hill, to the north of and opposite to the Richmond Boarding House.

The specimens from which these analyses were made were not shown in court, and hence no description is obtainable beyond the mention of the localities. It will be observed, however, that the analyses Nos. 21, 22, 23 from samples, taken from the Bell shaft tunnel and its vicinity, correspond satisfactorily with the results obtained by Messrs. Luckhardt and Huhn. These still further confirm the statement that the rock is very nearly a typical dolomite. Every sample, without exception, proves the country rock to be more or less magnesian.

MICROSCOPICAL ANALYSIS.

In order more definitely to investigate the interior or vein limestone and the exterior or country limestone, specimens of each were ground down to a thin film and carefully examined. The samples thus selected were portions of the same pieces from which analyses Nos. 2 and 19 were made by Messrs. Luckhardt and Huhn. The former is a characteristic sample of the vein limestone, and the latter of the country limestone. Examined under the microscope, the exterior limestone appeared homogeneous, while the vein limestone, on the contrary, showed an entirely different mechanical aggregation of the particles. The different particles seem to be cemented together with a pasty substance in a manner unlike those of the country rock

Beyond the exterior or country limestone, we find a comparatively broad belt of highly tilted calcareous shales, which have been heretofore mentioned in describing the general geology of the district.

MAP AND MODEL.

To the better explanation of the vein phenomena and workings, a complete map and a model of glass were made by Mr. T. J. Read, C. E., and presented in court. The map shows on a horizontal projection nearly all the superficial and deep-lying ore bodies, as well as all the main shafts, tunnels, drifts, winzes, and connections of the K. K., Eureka Consolidated and Richmond mines. The foot and hanging walls, wherever developed, are shown upon it. Each of the levels is designated by appropriate numbers and letters; and the ore chambers are so marked as to correspond with the respective levels whereon they are found. Low grade ore, and ore stains, *i. e.*, oxide of iron carrying traces of lead, gold and silver, are indicated by shading on each side of the levels and winzes. The workings of the Phenix and Jackson claims are not delineated upon the map.

The model shows the principal ore bodies in the vein as they appear beneath the surface, looking through the Hill from the east or from the west. The model consists of 16 glass plates set vertically one inch apart, and is constructed on a scale of 100 feet to the inch. Plates Nos. I., II., III., IV. and V. represent vertical sections, through the Richmond mine. Plate VI. represents a section through the end lines of the adjoining patents of the Eureka and Richmond claims. The remaining plates represent sections through the Eureka mine.

The ore bodies, placed upon the model, show from actual survey the spaces from which mineral was extracted and worked in the furnaces. Around and particularly beneath nearly all of them, large masses of ore are still left standing, which are of too low a grade to be worked at present. Two very prominent, and at one time very rich ore chambers, to the south of or below the surface chamber of the Champion, are not delineated either upon the map or model. This was owing to the fact that a survey was impossible because they were long since worked out; have caved and been filled up. Also, quite a large number of the smaller isolated ore bodies were left off, either because they came between the plates or because on the scale of 100 feet to the inch they would have to be represented by small dots. The contour of the surface, it will be observed, is represented by waving lines, and the places of the hanging and foot walls by inclined lines on the north and south. (A stereoscopic view of this model was exhibited to the Institute. A copy of the map accompanies this paper.)

With a few explanations the map will be fully intelligible. At the lower southwesterly portion we find the Tip-Top, Richmond, and Lookout claims patented to the Richmond company. In the center we find the Nuget, Champion, At Last, Margaret or Lupita, Savage, Buckeye, Mammoth, Sentinel, and Elliptic belonging to the Eureka Consolidated. All of them have been patented except the last.

The original workings of the Richmond were at the Richmond-Tip-Top Incline, from whence they followed down on a series of more or less closely connecting ore bodies to and beneath the point marked "Potts Chamber, fifth level." Here, it will be observed, the shoot of ore has passed laterally across the dividing line of the claims extended on the dip of the lode, and has come into the ground of the Eureka Consolidated. The present main working shaft of the Richmond is marked "Richmond shaft." It is situated on the northerly slope of the hill, about 200 feet below the comb of the ridge, which passes along easterly and southeasterly through the Lookout claim at about the At Last-Margaret dividing line. From this shaft seven levels have been run out both easterly and westerly. The deepest is 900 feet from the surface.

The mines of the Eureka Consolidated were, like those of the Richmond, originally worked from the southerly slope of the Hill. The Eureka workings were at the Champion and Buckeye, and on the northeasterly slope at the surface ore chamber of the Sentinel. The old shafts marked upon the map are the Windsail and Buckeye; the former is about 250 feet deep, and the latter about 150 feet. Both of these reached the quartzite. Three levels were run off from the Windsail shaft and one from the Buckeye. Besides these, there were quite a number of small shafts and inclines sunk on or near the footwall on the Nuget, Champion, Savage, and Buckeye, which are not delineated on the map. The Bell shaft, on the northern side of the hill, was sunk a short distance and then abandoned. The present main working shaft of the Eureka is at the point marked "Lawton shaft," on the extreme easterly line of the Elliptic. From this shaft nine levels have been driven, the deepest being 730 feet from the surface. An inner level, not directly connecting with the shaft, has been run from the bottom of the 100-foot winze at the point 9 V on the ninth level. The first level of the Eureka is called the Lawton Tunnel. It connects with the main shaft by a short side drift. This tunnel starts in the narrow ravine below or to the east of the K. K. hoisting works, and runs entirely through the hill in a southwesterly direction. It passes within a few feet of the Buckeye shaft, connects with it, and also with several of the old ore stopes on the southern side of the hill.

The K. K. has four minor shafts and one main working shaft on the ground delineated upon the map. The main shaft is at the point marked K. K. shaft From it seven levels have been run out, the deepest being 725 feet below the surface.

The Richmond shaft enters the footwall, between its sixth and seventh levels, at a point about 650 feet below the surface. The Eureka shaft enters the footwall, between its sixth and seventh levels, at a point about 450 feet below the surface. The K. K. shaft enters the footwall, between its fifth and sixth levels, at a point about 550 feet below the surface. The collar of the Richmond shaft is 170 feet, and that of the K. K. shaft 58 feet, below the collar of the Eureka shaft.

* A paper read before the American Institute of Mining Engineers at the Amenia meeting, October 24, 1877.

It will hence be observed that the K. K. shaft, lying only 120 feet east of the Lawton, enters the footwall at a point 158 feet deeper than the latter.

This statement, showing a sudden falling away of the quartzite, will render clear the explanation as to the K. K. second level cross-break, heretofore alluded to.

The numbers on the map indicate points referred to in the evidence during the recent lawsuit. Where a number is followed by a letter, the former indicates the level. Thus, 8 H is the point H on the eighth level. Heavy marking of the sides of the levels indicates ore or "ory matter," according to Mr. Read's testimony in court.

ORES AND ORE BODIES.

All the ores of the Eureka lode bear a striking similarity. They consist, in the main, of highly ferruginous carbonates of lead. Subordinately we find oxide of lead, arsenio-chloride of lead, molybdate of lead, sulphate of lead, arseniate and carbonate of iron, oxide of zinc, galena, iron pyrites, and rarely oxides and carbonates of copper. They are, in a word, chiefly oxidized ores, the product of the decomposition of galena and of iron and arsenical pyrites, all carrying a greater or less percentage of gold and silver. The workable ore ranges in value from $40 to $70 and upward in gold and silver, with from 16 to 30 per cent. of lead to the ton of 2,000 pounds. The richest ore is that species of carbonate of lead called by the miners "black carbonate."

This ore carries 60 to 70 per cent. of lead, and assays in gold and silver from $100 to $300 per ton. It occurs most commonly in streaks and masses on or near the footwall.

At the K. K. third level we find a huge mass of nearly pure quartz ore carrying scarcely a trace of lead. This occurrence is entirely unusual in the mines of Ruby Hill. This ore is quite rich in gold and silver, yielding by assay from $25 to $175 per ton. It lies nearly midway in the ore channel; extends above the level about 25 feet, and below it a distance of about 45 feet; the cross drift shows its width to be nearly 90 feet. Its length has not yet been definitely developed. Over it was found a rich streak of carbonate of lead which dipped down behind it to the footwall. The quartz is not hard and compact, but has a sugary texture, as if deposited from water. It lies directly beneath the narrow gulch which heads on Prospect Mountain. The only ore ever found on the hill resembling this was a portion of the outcrop at the Buckeye, which was very silicious. The ores in general, as well as the vein limestone, carry very small amounts of silica.

The outcropping of ore on Ruby Hill was originally found on the Champion and Buckeye claims on the south side. It appeared here as an earthy looking oxide of iron, with which some carbonate of lead and galena were intermingled. This ferruginous matter was found irregularly distributed over a space 480 feet in width, between what is now called the Lupita excavation on the north and the Buckeye on the south. To describe the outcrops in their order, we may begin at the extreme westerly end of the hill. There we find the Richmond-Tiptop ore body appearing in a small cave on the side of the hill, and two or three smaller bodies of low grade ore at the shafts further to the northwest. Below them and near the quartzite contact other bodies of ore were subsequently found.

Between the Tiptop incline and the Champion claim we find, also, a rather prominent outcrop at the Virginia or Iron shaft, and three minor patches of low grade ore at the points marked II., III., and IV. on the map. Thence proceeding easterly, we find the large surface chamber of the Champion; then the huge connected outcrop at the Buckeye; thence nearly due east we find the surface ore chamber of the Sentinel; thence easterly again, in the ground of the K K., we have the Marcellina outcrop, most unaccountably left off the map; thence, in the same direction, we have the two outcrops at the two small shafts in the gulch; thence, a little south of east, and still upon the K. K. claim, we find the Carson outcrop; thence south of east we have the Deap and Phenix outcrops, and lastly, southeast, we find the Jackson outcrop.

Between the Jackson and the Tiptop we can enumerate a total of thirty-four outcrops, all of considerable extent. Most of them were originally quite small, some, like the Buckeye and Champion, developed to a enormous extent. The extreme points of these claims are over 800 feet apart, as may be seen upon the map, and the ore has been traced almost the entire distance.

When first discovered, the ground between these points appeared to be nothing but limestone, which, however, subsequently proved to be merely a thin capping of cemented debris.

The largest surface body visible in 1869 and 1870 was the first bonanza of the Jackson. This was an egg-shaped mass of ore, about 70 feet long, 20 feet high, and 30 feet broad. It did not descend to any further depth, and showed no visible connection with any other ore body.

The Tiptop outcrop, as already stated, was found inside a small cave. So little did it attract attention that the Richmond locators who had placed their notice, as is reported, at the iron shaft, very near it, failed to observe it. They took no steps to secure it until ore was found in it by the Tiptop miners. To the latter it properly belonged, but the former party claimed it as being on their location, and after much wrangling the dividing line was fixed at the cave.

None of the Buckeye or Champion surface ore bodies extended to any great depth, for the reason that the quartzite footwall lay close beneath them, to which they, in almost every instance, extended. The exceptions to this well defined law of the ore bodies were the first surface chamber of the Champion, and some miner stringers near the Buckeye shaft. These ran up the hill to a thin point, and were in shape something like the glass Prince Rupert drops. Beneath both, however, were other large and valuable bodies of ore, which dipped down to the footwall.

Pursuing our investigations beneath the surface, we find the main ore bodies either upon or tending directly towards the underlying quartzite. Those which do not obey this law are simply spurs and branches making up into the vein limestone. In the K. K., below the third level, all the ore is found immediately upon the contact. On the fifth level we follow the pay ore along the quartzite a distance of nearly 300 feet. The new fourth level ore body starts in the vein limestone, and as it dips will soon reach the quartzite.

In the Eureka we find the ore along the contact for a distance of 50 to 150 feet. The largest and most valuable shoot of ore ever discovered in this mine is found upon the quartzite at the extreme westerly end of the fifth level. Here the footwall, as already mentioned, makes a sudden bend to the south-west, and upon it is found a thick mass of rich black carbonate, making downward on both sides of the promontory. A portion of this ore continues down on the westerly side of the quartzite cape, passes across the dividing line of the claims, and becomes the property of the Richmond Company. Another and probably larger portion makes its way downward north-easterly along the contact (not, however, with uniform and connected richness), till it expands into a very large body at the ninth level. Here we find a huge cavern at the north-west end, in and beneath which the bonanza attains its greatest development. Beneath the ninth level the ore continues downward, on the line of contact, as far as the workings extend, a distance of 160 feet. At the lowest point a level has been driven east along the quartzite over 200 feet, which carries high grade ore the entire distance.

The Jackson mine, also, half a mile to the south-east, carries fine black carbonate on the footwall, at the 460-foot level, for a distance of about 200 feet. The ore body underneath the cavern in this mine, is not upon the footwall, but its dip is such as will certainly carry it to that point.

The Richmond ore bodies, on a superficial examination as far as the fifth level, would seem to belong to a different system. The outcrop starts in limestone, whence the ore dips down gradually to the bottom of the incline. Here we find the stopes extending north-easterly and quite flatly, to a point a little beyond the north-easterly side line of the Lookout patent. At this point we pass down through the Rossiter Incline, and come to the Flat Chamber, an almost horizontal body of ore. Thence we pass down through steep winzes, through the intermediate levels, until we come to the Potts Chamber. The ore is not continuous throughout the entire distance, but is broken at two places, where the ore stains are either very scanty or totally absent.

Viewed as a whole, this ore-shoot is made up of a string of ore bodies following one another irregularly downward and forward to the north-east. The developments have taken this direction rather than a northerly or north-westerly course. Had the latter been pursued, the ore-shoot would very likely have been shown to connect with the ore bodies at the west of the shaft on the fifth level.

One portion of the Potts Chamber connects with the quartzite. Low grade ore and ore stains are found upon the footwall, and from thence to the ore stopes only ten feet distant. On the Richmond footwall at the point 69 B fine carbonate ore is found.

It will thus be seen that the Richmond series of ore bodies, like all the rest in the mineralized zone, approaches the footwall in depth. Below the Richmond sixth level, in the drift 6 L, low grade ore is found extending southerly a distance of fully 100 feet. Directly opposite to this drift, at the same depth, we find the Eureka drift, 10 E, advancing to meet it; ore stains and low grade ore are found in this also. There now remain but a very few feet to connect the two. There is no reason to doubt that the low grade ore will continue, and thus bring the Richmond ore shoot definitely down to the footwall.

Besides the ore bodies in or near the quartzite, we find, as the walls approach in depth, considerable deposits upon the hanging wall.

Still again we find numerous isolated bodies away from either contact. The Eureka has uncovered such bodies on several of its levels. The Richmond, also, has two such bodies on its fifth level west of the shaft, which are quite large, and which promise to be valuable.

They have another isolated body near to the shaft on the eighth level at a point 44 feet away from the footwall; also, several smaller bodies in the winze near the shaft connecting with the ninth level; also at several places in the Lizette Tunnel. In addition to the isolated bodies just enumerated, we find low grade ore and ore stains very generally scattered throughout the vein limestone wherever drifts have penetrated it.

Assays of a large number of these ore stains, taken from various localities on the surface and beneath it, were put in evidence in the recent suit. As fair samples we may present the following: No. 2, $12.55; No. 3, $5.80; No. 4, $2.19; No. 44, $3.60; No. 47, $5.74; No. 48, $3.92; No. 49, $3.14.

Numbers 2, 3 and 4 were from the surface of the Richmond at the points marked on the Map II., III. and IV. No. 44 was from the extreme westerly end of the Eureka third level; Nos. 47, 48 and 49 were from the Eureka ninth level.

Ore extends in the Jackson mine from wall to wall at the point on the 460-foot level where the quartzite and shale come nearly together. A like phenomenon is visible at the K. K. third level, where the walls are 280 feet apart.

The Potts Chamber also touches the hanging wall at the bottom of the winze, 6 G, on the sixth level of the Richmond, and comes within 10 feet of the footwall at the point on the level above heretofore noted. The ore bodies generally follow the depressions of the footwall, and occasionally pass across the promontories.

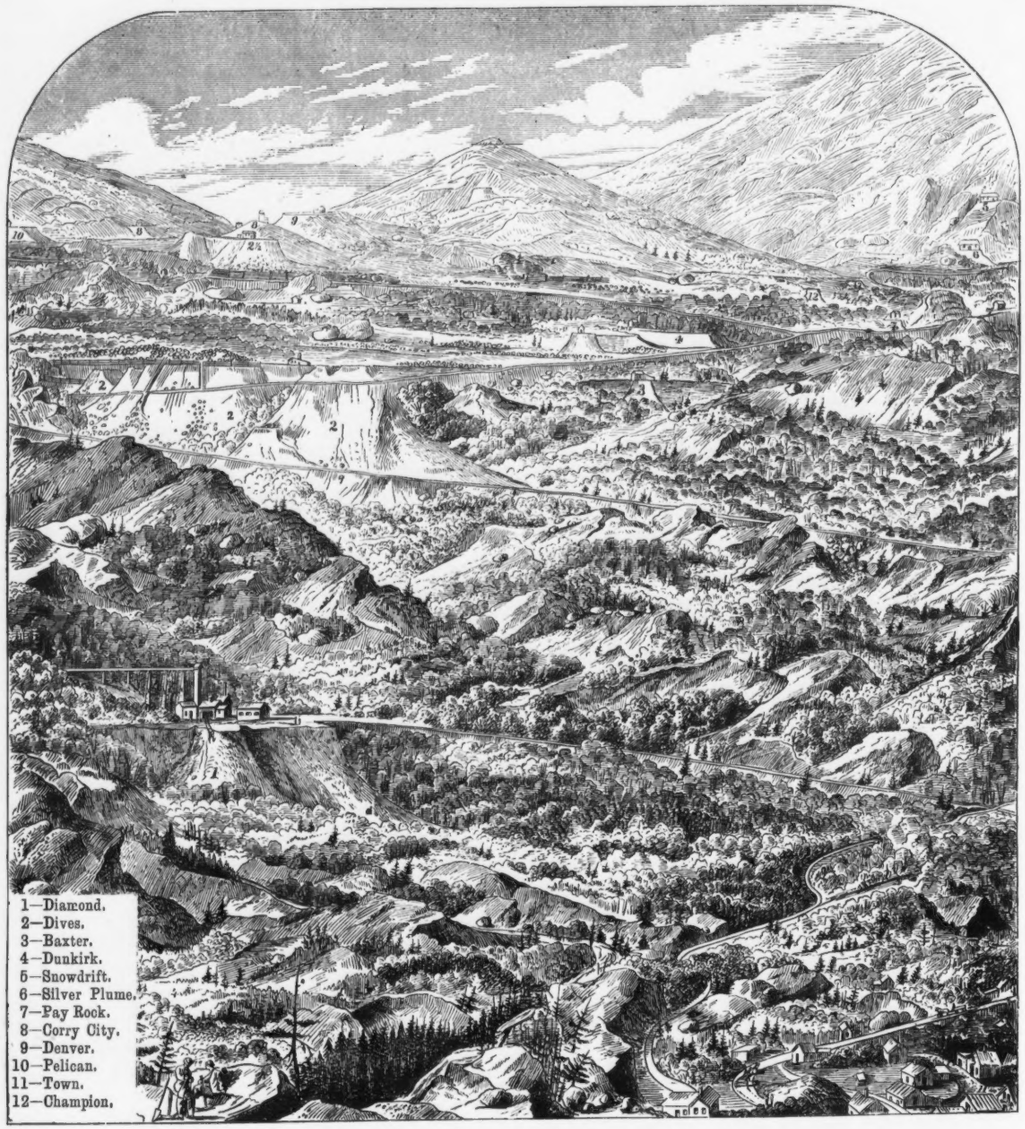
Those in the Richmond, pitch northerly and northeasterly; those in the Eureka, northerly, northwesterly and northeasterly; while those in the K. K., pitch mainly northeasterly. I use the word pitch, as contradistinguished from dip, to denote the inclination of the ore shoots laterally. The dip, in strictness, must be at right angles to the course, and hence does not describe a variation from that direction.

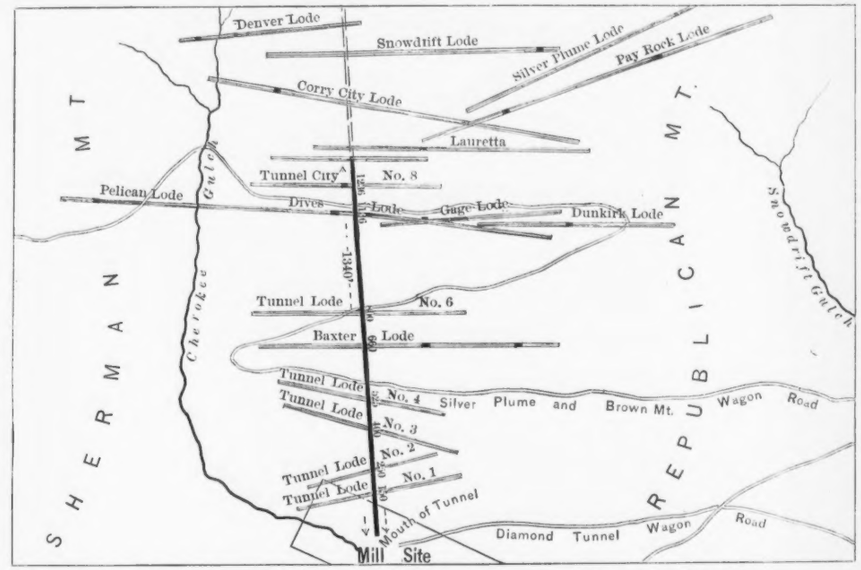
The surface map accompanying this paper is also the work of Mr. Read, whose skillful, patient and constant labors have done so much to elucidate the relations of the ore bodies in Ruby Hill.

Elaborate maps were also put in evidence during the late suit by the Richmond Company, prepared by their surveyor, Mr. Westcoat. The company, moreover, exhibited a glass model, constructed on a different system from that above described. In this model the main sections were horizontal, and vertical sections taken at will were represented by introducing vertical glass plates between the horizontal ones. The effect was to give a striking representation of those bodies of ore which it was desired to emphasize, and to omit the rest almost entirely. The two models reduced to the same scale, and taken together, would have given a fair complete picture.

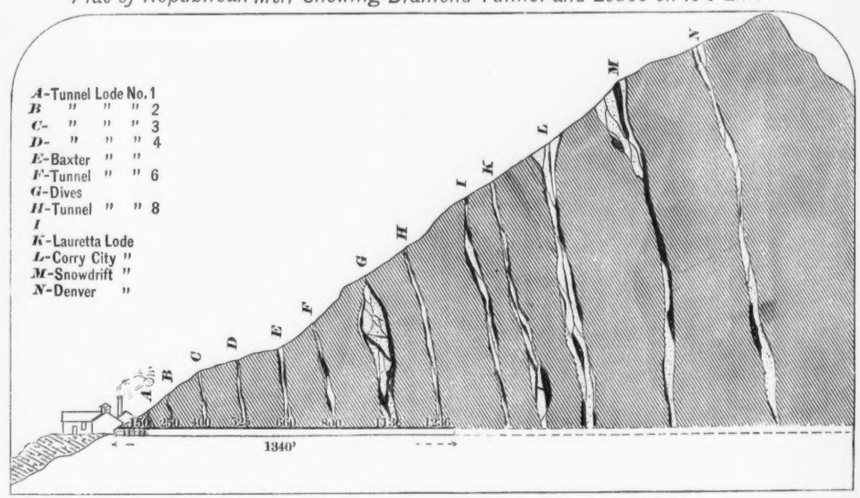
It will sufficiently appear from the foregoing description that the mineralized limestone zone of Ruby Hill, which I have called a lode or vein, is not so-called because it conforms strictly to the definition of a fissure vein, given in the books. The term has been used in the miners' sense, and in the sense in which, as the court declared, it is employed in the law. At the same time my object has been to describe fully the thing itself; and if any exact and recognized English name for it can be suggested, I shall be glad to hear it. The latest writers, at home and abroad, confess that the deposits of lead ore in limestone do not strictly fall under the old Saxon classification. This is from the declaration of Prof. Cotta, who may be regarded as one of the authors and the chief representative of that classification. But I leave to other hands the theoretical discussion of the phenomena, and of the principles, both of geology and of mining law, illustrated by them.

PRODUCTION OF THE BRITISH COLUMBIA GOLD MINES.—A. W. Vowell, Gold Commissioner of the Cassiar District, British Columbia, reports that the number of miners has not at any time in the last year exceeded 1,200, including 300 or 400 Chinamen, and the yield has been $500,000, including $173,000 from Thibert's Creek, $145,000 from McDame's Creek, and $81,000 from Deare Creek. The season was not favorable, on account of numerous freshets. He thinks Thibert's Creek may double its yield next year. The Cariboo District produces about $500,000 annually.





Plat of Republican Mt., Showing Diamond Tunnel and Lodes on it's Line



Section of Sherman Mt. along line of Diamond Tunnel.

DIAMOND TUNNEL PROPERTY, GEORGETOWN, COLO.

THE DIAMOND TUNNEL SILVER MINING PROPERTY.

(WITH SUPPLEMENT.)

Staff Correspondence of the Engineering and Mining Journal.

The Diamond Tunnel property, illustrated in this issue of the JOURNAL, is located about one and a-half miles west of Georgetown, Colorado, at the now prosperous town of Silver Plume. The franchise includes the right of passage, exploration, and discovery under Republican Mountain, directly under the heart of what is at present the richest mineral hill in the State. On our supplementary sheet the general lay of the ground is accurately shown in the plate; the handsome view of the steep mountain side, from sketches by Gen. F. L. Vinton, is equally reliable, and will be readily recognized by all who have been on the ground; while the section through the hill along the line of the tunnel shows some of the more prominent veins intersected by it, and several of these still ahead of its workings.

Until quite recently, tunnel properties have hardly been appreciated. Driving a hole into the mountain side in search for the downward continuation of veins known to exist above, has been, as a principle, lightly regarded. A vast number of these enterprises have been begun and carried on for a time with great vigor, and finally have been allowed to languish. And it must be confessed that in a great number of cases heretofore success has been wanting. The veins were found, but they were generally intersected at barren places, and left behind unprospected. Finally, the time came when resources were exhausted and patience gone, and the work was given up as a dead loss.

Within the last two years, however, in the general revival of interest in mining, numerous explorations have been made on veins opened in depth by tunnels, and so many cases of satisfactory results have occurred that prospecting mineralized mountains by deep adits has again come into favor, and this time with the certainty of good results to come.

It is not to be supposed, however, that the Diamond Tunnel belongs to this class of once-abandoned and subsequently re-opened properties. It is, in fact, an enterprise of recent date. Since work was first begun by the company, which is a Baltimore organization, owned and carried on by four gentlemen, one of whom, Mr. J. A. Fish, is the superintendent of the works, there has been no cessation of labor. Contract after contract has been let and completed, vein after vein has been cut and passed, until, at the present date, the total length of the bore is 1,400 feet, and the number of lodes opened nine.

Republican Mountain is one of the most precipitous hills in the vicinity of Georgetown, and at the same time one of the tallest. Its crest is 3,000 feet above the bed of the deep gulch in which the town, Silver Plume, rests, and 1,000 feet above timber line. On mechanical principles alone, therefore, there are excellent reasons why the numerous and magnificent veins which course through it should be opened by deep tunnels rather than by shafts. At the time, also, when the Diamond Company began work, the value of a number of lodes upon the hill had been definitely shown, and there was none of the hazard in the undertaking which characterized many other similar works.

Discoveries were made on Republican Mountain as early as 1865, but very little mining was done for several years. The Snow drift was, perhaps, the first run of note found. This claim was bought by an English company, and in due course of time, as is generally the luck of our cousins across the Atlantic, it became involved in litigation, and ceased production. The Silver Plume was the next vein to step into prominence. It likewise became English property, and fell among the lawyers, and for several years past has been producing but a small amount annually, nearly all of which has been absorbed by expenses. It will be years, in all probability, before these two claims, which are really very valuable ones, will be clear of trouble.

The discovery of the Pelican Lode, which created the second excitement on Republican Mountain, occurred in 1870. So rich was the ore extracted, and so large the quantity found, that the fortunate discoverers became in a few weeks or months quite wealthy. The successful opening of this noted mine having attracted the attention of owners and prospectors on the hill, who had suffered their properties to remain idle for years, a great many old discovery holes were cleaned out, shafts began to be sunk into the heart of the hill, and an extensive crop of most valuable discoveries appeared. Prominent among the new mines were the Dives, Antelope, Eaglebird, Payrock, Hopewell, Zillah, Moose, Dunkirk, Baxter, Denver, (Corry City), and Champion. Of these, nearly all showed a fine body of ore at the surface, and have been rapidly developed into standard properties, which will be worked and will be profitable as long as there is any mining in the State. It is now about eight years since extensive and organized work began on the hill, and six since the excitement which began with the Pelican discovery. During that time a production of something over five and a half millions in bullion has been made, produced almost wholly from the higher grades of ore, the lower grade ranging from 60 oz. per ton downward to 20 oz., having been, until within the last two years, thrown over the dumps as worthless.

A glance at our fine view of this hill is enough to prove that vigor and energy have been engaged in exploring its veins. The whole mountain side from base to crest is spotted with white dumps, several of which are hundreds of feet in length, and contain thousands of tons of debris. At places where the hill is especially precipitous, so that it became dangerous for the miners high up to let loose their waste rock on the steep slope, extensive cribbings have been built to retain the dumps, and in one instance a long chute has been built, through which the rock which could no longer be stowed away within these artificial barriers is shot down over the road, which winds up from the valley to the mines, and landed in places where it could do no great damage.

Republican Mountain is bounded on the west (the left hand side of the picture) by Cherokee Gulch, a shallow ravine, which originates a little below timber line, and ends its career a few hundred feet below the mouth of the Diamond Tunnel. In its course about half way down, and occupying a position which prevented General Vinton from including it in the picture at the same time as the mouth of the Diamond Tunnel, and the lower workings of the Dives, is the Pelican, and the three great dumps which mark the mouth of the three tunnels through which it has been successively worked. Still further to the left, and wholly out of the boundary of the sketch, lies the Coldstream, also one of the noted veins of the mountain. We were especially desirous of including these two famous mines in one view, but to accomplish it, while at the same time showing the tunnel mouth and the mines on the face of Republican, one of two courses had to be adopted. Either the natural ridge of the hill on the east of Cherokee Gulch had to be cut away in the picture, and a false sketch made, or else a point of view had to be taken on the opposite side of the gulch, fully a mile away. The first was of course inadmissible, while the second would have resulted in a view of the mountain side, so seldom seen even by old residents of the locality, that it would have hardly been recognized. It is to be regretted that Nature interposed these obstacles, for the Diamond Tunnel will be before long, as it is partially already, the great highway through which these mines will be worked.

The tunnel enters the mountain about 75 feet above its base, directly back of the enterprising little town of Silver Plume. Its course is north 20° west (magnetic), and its line is true as an arrow. The section in the clear is 7 feet high and 8 feet wide. There is ample room for two lines of tramway of broad gauge, two of which are now laid as far as Baxter mine, and one to the end or breast of the tunnel, with switches at the intersection of lodes, and to ore houses on dump. The grade is ten inches to 100 feet. At the mouth is a good blacksmith shop, an ore-dressing house, and buildings for ventilating machinery. The tall scaffolding work shown in our picture was used for a water trompe, but ample ventilation is secured now through connection with the workings of the Dives and Baxter lodes, both of which have shafts to the tunnel level. The rock passed through is hard and close-grained granite, showing at times seams of tough flint. The tunnel is laid throughout with iron T rail weighing 12 lb. to the yard.

The company have laid out a road having an excellent grade from the tunnel to the town of Silver Plume, through which passes the main cañon road to Georgetown, one and a-half miles east. It is secured by charter, and nearly completed. It has also taken up and patented two and one-third acres around the mouth of the tunnel, extending down to the town limits, as a mill site, for dressing works and dumping ground.

The company has two objects in view: First, to prospect the mountain, discover veins blind on the surface, and to open veins lying across its path, which it has purchased; and, second, to drain mines owned and worked by other parties, and to furnish a common highway for the economical transportation of ores.

It has already discovered and taken up several veins while driving ahead, and has lately purchased the Corry City, a huge lode lying about 400 feet north of the Dives, and about 250 feet in front of their present heading. When this, which is claimed the mammoth vein of the mountain, is cut, it will be explored extensively, and from its known value through surface workings, is likely to be a very productive property. It will be cut at a depth of about 1,000 feet below the surface. Two of the other veins, which are numbered in both the plot and section, are now being worked with good results, and the others will be worked as soon as the objective point of the tunnel is reached. As the development of the other properties upon the hill progresses, the advantage of a common highway, at great depth, for the transportation of ores and for drainage becomes apparent. Two of the veins so far cut—the Baxter and Dives—are working through the tunnel, and a point will soon be reached in the progress of the enterprise when it will no doubt be paying large dividends. The precipitous nature of the mountain, and the cost of transportation to and from the mines, far up the side, would ultimately force each company to cut a tunnel of its own, if this one did not exist.

Intersecting, as it does, one of the richest belts of silver mines in the State, the Diamond Tunnel property is destined to prove of immense value; and the business-like manner in which the enterprise has been carried on so far is an ample guarantee that there will be no lack of push and enterprise in the finish.

As will be seen on the engraving, lodes have already been cut during the progress of the work as follows:

No. 1, reached at 150 feet from the mouth.

No. 2, at 250 feet from the mouth.

No. 3, cut at 400 feet, is a very large lode at this point, nearly 50 feet in width, showing some fine rich mineral interspersed through the gangue.

No. 4, cut at 524 feet, is a small vein of rich ore carrying galena and ruby silver; average mill returns, 679 oz.

No. 5, cut at 660 feet, has been proven to be the Baxter lode, and the lessees are now working through the tunnel, paying the Tunnel Company tribute. This vein is intersected 365 feet from its outcrop.

No. 6, cut at 800 feet, is a strong vein, worked under lease, producing very good ore. After passing 900 feet numerous small spurs of mineral were cut. At about 1,140 feet, No. 7, a lode 6 feet wide was cut, and within the next 40 feet 4 other veins were cut.

In drifting on No. 7 lode connection was made with the shaft which had been sunk on the immense vein which, at this point, is the property of the Dives, Perdue and Pelican companies. Visitors to the Centennial Exhibition may remember having seen in the Colorado building a small chunk (in miner's parlance) of ore weighing 4,600 pounds, and labeled the "Commodore's Silver Button." This chunk was taken from ore of the mines cut by this tunnel, and we allude to this one specimen in order to show the size of the veins as well as richness of the products of this mountain. The four gentlemen owning this tunnel property have advanced the money for its development as it was required. No stock has been placed on the market, and the entire property is owned by them with a clear and complete title.

SOUTH AUSTRALIA.—A bonus of £10,000 has been offered for the discovery of coalfield. The average rate of earnings per man per week for the four months, ending September last, at the Wallaroo Mine, was £2 2s. 4½d.

EFFECTS OF FORESTS ON THE SALUBRITY OF THE ALGERIAN MINING REGIONS.—It is hardly more than fifteen years since the first Australian eucalyptus trees were introduced into Algeria, yet their growth has been extraordinarily rapid. Some remarkable examples are given of the action of the eucalyptus in improving the sanitary condition of unhealthy districts. Formerly it was impossible for the workmen at the great iron mines of Mokta-el-Hadid to remain there during the summer; those who attempted to do so died, and the company was obliged to take the laborers to the mines from a distance by train every morning, and to carry them back every night. From 1868 to 1870 the company planted more than 100,000 eucalyptus, and now the workmen are able to live all the year through on the scene of their labor. The entire works and the railway leading to them are bordered with thick belts of these trees, and each of the miners has his cottage and kitchen garden surrounded with them.—*Sanitary Record.*

NOVEL LOCOMOTIVE FOR COAL MINES.—An engine, worked by compressed air, was recently tried at the Earl of Durham's Colliery, at Philadelphia, England, and so far as the trial proceeded, it gave great satisfaction. The mode of working the engines moved by compressed air, which are in use in the collieries on the Tyne and Wear, is as follows:—The engines employed in compressing the air are placed on the surface, and the compressed air is carried down the shaft and into the workings to any distance by pipes which are fitted with air-tight joints. Hauling and pumping engines are placed at intervals, as required, according to the circumstances in each mine. To avoid the expense attendant on the hauling engines, a locomotive small enough to be used in the levels of mines was needed, with a tank attached, capable of containing sufficient air to supply the engine working from station to station. This is the form of engine which has been successfully adopted in the Earl of Durham's collieries.

THE ONTARIO MINE AND MILL.

[WITH SUPPLEMENT.]

Special Correspondence of the Engineering and Mining Journal.

A description of the Ontario Mine and Mill may prove of interest to some of your readers, more especially as the vein is a peculiar one in Utah, and the mill the largest and best in the Territory.

The mill is at Park City, thirty-two miles from this city, and the mine something over one mile from the mill, in Ontario Gulch, a cañon running between low hills, south of Parley's Park. These hills are composed of quartzite, the strata having a course northeast and southwest. and dips to the southeast, while the Ontario vein has a course northwest and southeast, and dips at an angle of 70° to the northeast.

The vein was discovered just above the bed of the cañon, and developed by an incline on the vein, and later by two levels run on the vein from either side of the cañon, which here has a course north and south. Later, when the vein was proved, hoisting works were provided, and the sinking of a shaft commenced in the bed of the cañon. This shaft was originally 8 by 4 feet in two compartments, one for a cage, the other for the pumps.

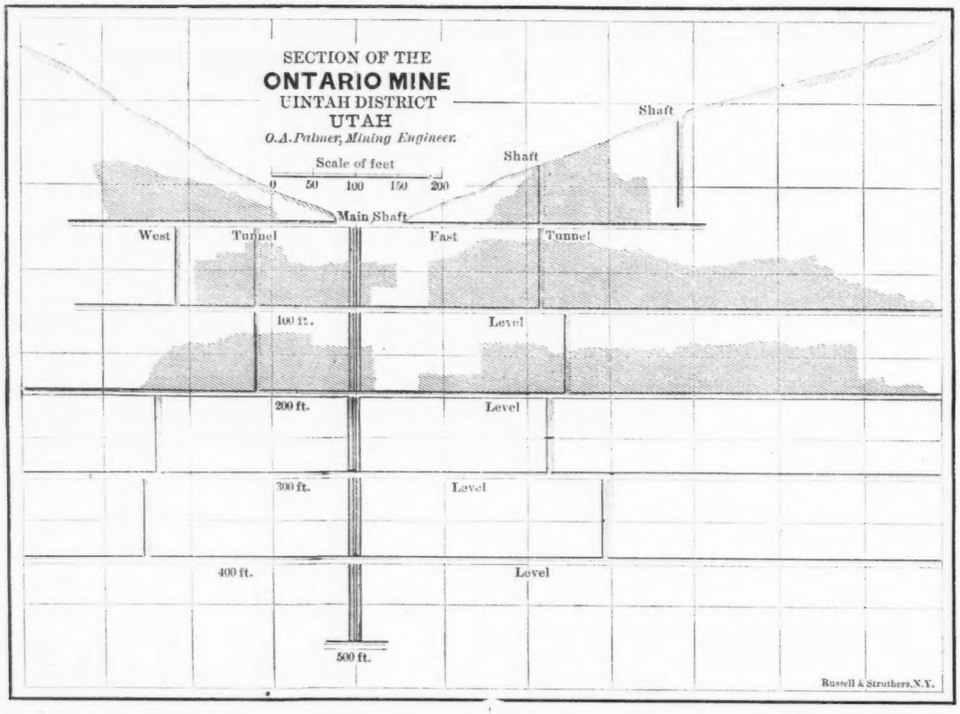
The shaft was started in the hanging wall, stations being made as each hundred feet in depth was gained, and crosscuts run to the vein. At the bottom of the shaft the vein was cut, and sinking will now continue in the footwall. As depth was gained, the shaft was found inadequate, and another compartment was added. From the points where the vein was intersected by the crosscuts, the levels were run either way along the course of the vein, opening in the three upper levels about 1,500 feet on the length of the vein, while in the fourth level driving is still going on in ore. On the course of these levels winzes have been raised every fifty feet, and the levels connected, affording splendid ventilation, and an immense capacity for ore. The shaft is now down to the 500-foot level, and the station open, and the levels commenced. The ground above the third level has been thoroughly explored, while in the fourth level the limits of the ore body has not yet been reached, and but the first two or three winzes raised from this level have as yet reached the third level. Below the fourth nothing has been done excepting sinking the shaft. The vein disclosed in these workings is a fissure vein, cutting the strata in course and dip, and having an average width of four feet, of which more than half will pay to send to the stamps.

Thus far the ore body has been found continuous in length for over 1,300 feet in length, and the vein looks very well in the 500-foot level. The character of the vein as a true fissure vein, and the large size of the ore body, renders the vein peculiar. The ores are divided into two classes—free and base—the first being amalgamated raw, while the last are chloridized in a Stetefeldt furnace.

MINE MACHINERY.

Water has been the most troublesome factor in the working of this mine. At first a Cornish pump was used, which was later displaced by a Silver & Atwood direct-acting pump, which is now on the second level. This pump has a 10 by 24 inch water cylinder. At the fourth level water made so fast that another large pump was needed, and a Knowles 12 by 24-inch pump was put in, with a relay pump, of the same pattern, 10 by 24 inch. One of these pumps drains the mine. The Silver & Atwood pump will now be sent to the fifth, and will drain that level till the shaft has reached the sixth.

The original hoisting engine is but 25 horse power, and has been sufficient up to the present, but will now be replaced by an 80 horse power twin engine, which will answer until the tenth level has been passed some distance, when, at the present rate of production, there will be ore reserves sufficient to last for several years. There are now six boilers for the pumps and engines, and two more will soon be added, when the four will be in constant use. A sawmill has just been added to cut and frame timbers for the mine.



THE ONTARIO MILL

This mill is probably the largest and certainly equal to the best in the country. It is a model of convenience in every way, and thoroughly well constructed.

The site was so chosen that there is plenty of fall from the ore-floor to the drying-floor, and from there to the stamps.

The ore-floor has a capacity of 3,400 tons. From this floor the ore passes over screens, the coarse going to two Blake crushers, and all thence having an inch discharge to the drying-floor, which is 53 by 76 feet. Under this are 13 flues, heated by the escaping heat from the Stetefeldt furnace and also by four fireplaces. Large scrapers are used for hauling the ore from the kiln to the stamps, friction gearing being used. The ore is fed to the stamps by Hendy's machines. There are 40 900-pound stamps, dropping nine inches about 90 times a minute. Twenty of these stamps crush base ore, and 20 free ore. The base ore is carried by a screw to an elevator, which carries it to the furnace.

Directly in front of and on a level with the battery floor is the pan-floor, while on the north side is the discharge of the furnace, also on this level.

There are 24 combination Wheeler & Varney pans, divided with 12 on either side, and below these 6 settlers on either side. Below the settlers is the main floor of the building, with sufficient space to give easy access to the shafting and belts of the pans and settlers. On a level with the floor is the retorting and melting room, and on the other side the engine and boiler room.

The engine is 250 horse power, horizontal engine, made by Prescott, Scott & Co.

Adjoining the boiler room is the coal house, with a capacity for about 1,000 tons of coal.

The capacity of this mill is from 65 to 70 tons of ore a day. The average value of the ore is, for free ore $95 to $105 per ton, and the base ore $125 to $135 per ton, this being the average for six months past. The mine can produce almost any given quantity of ore, but the output is limited by the crushing capacity of the mill.

S. C.

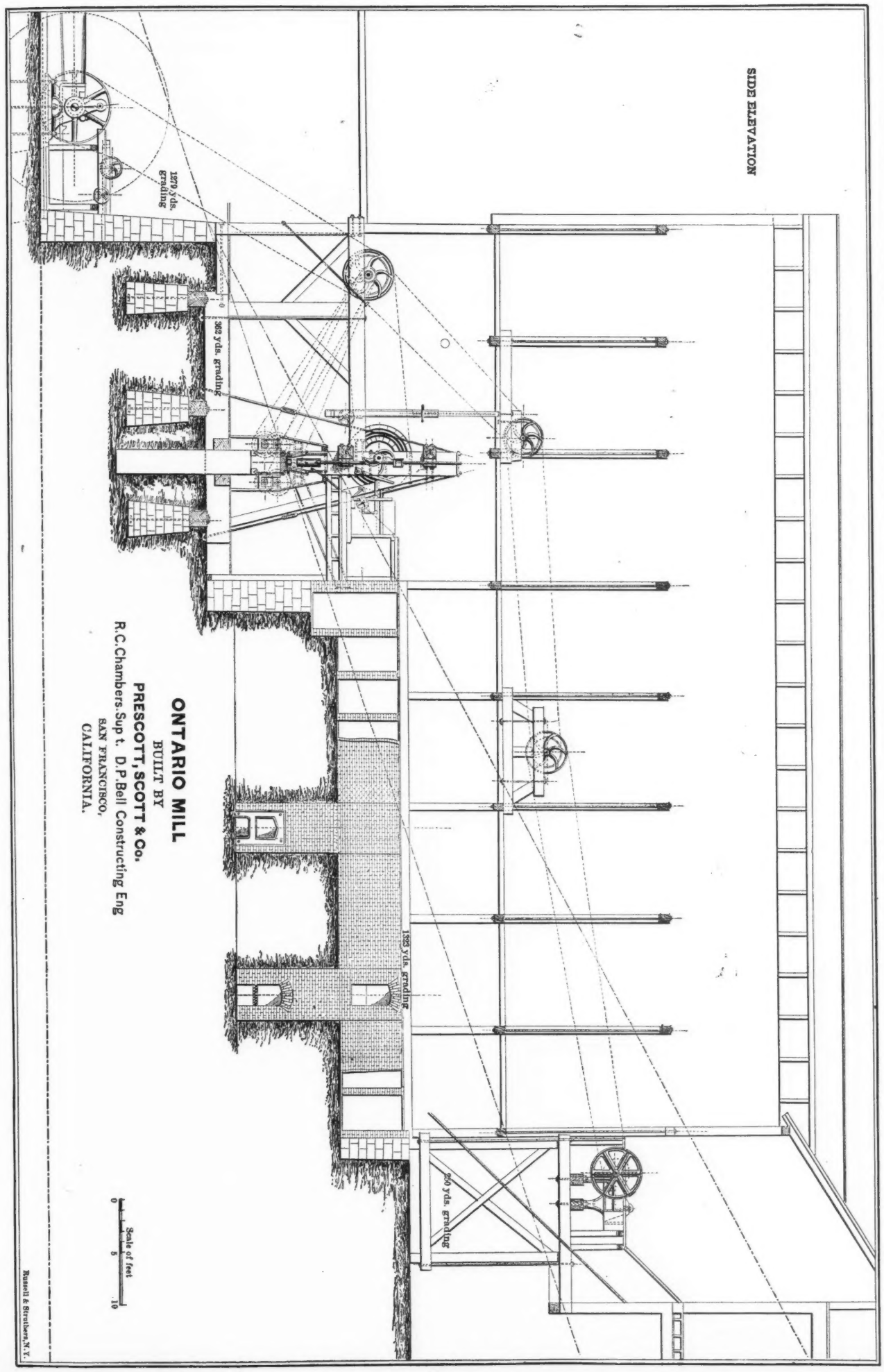
SALT LAKE CITY, Nov. 23, 1877.

NOTES.

THE FRENCH IRON AND STEEL PRODUCTION—1876.—The comparative make, import, export, and consumption of pig iron and steel in France during the years 1876and 1875, were:

	1876.		1875.	
Pig Iron:	Tons.	Tons.	Tons.	Tons.
Make	1,453,121		1,415,728	
Imports	198,934		204,719	
		1,652,055		1,620,447
Exports		52,151		148,266
Remainder for home consumption		1,599,904		1,472,181
Bars, Plates, etc.:				
Make	841,405		870,373	
Imports	85,876		75,959	
		934,281		946,332
Exports		136,091		140,898
Remainder for home consumption		798,190		805,434
Steel:				
Make	261,874		257,780	
Importation	17,181		6,627	
		279,055		264,407
Exports		25,137		43,877
Remainder for home consumption		253,917		220,529

THE TRANSVAAL.—A correspondent of a Cape Town paper, writing in June, 1877, says:—"Till lately I had intimate business relations with the Transvaal, and during the past six years have visited it frequently, and traveled over the greater part of it. My deliberate opinion is that the mineral wealth of this country is immense, its soil second to none in fertility, its climate one of the most salubrious and enjoyable in the world. Coal abounds in large quantity, and in actual juxtaposition with iron ore of exceptionally rich quality, which await the magic touch of capital to be transmuted into gold. Then about a hundred miles to the east of this coalfield, in the Leydenburg district, there is a large auriferous area, forty



ONTARIO MILL

BUILT BY

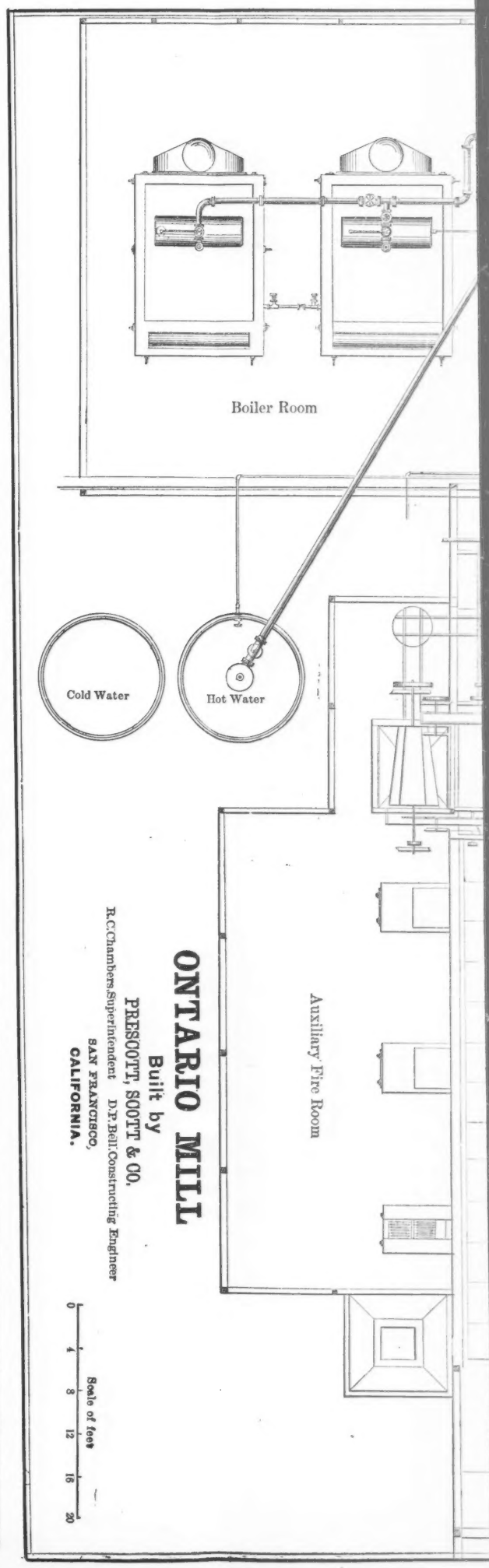
PRESCOTT, SCOTT & Co.

R.C.Chambers.Superintendent D.P.Bell Constructing Engineer

SAN FRANCISCO,

CALIFORNIA.

Russell & Struthers, N.Y.



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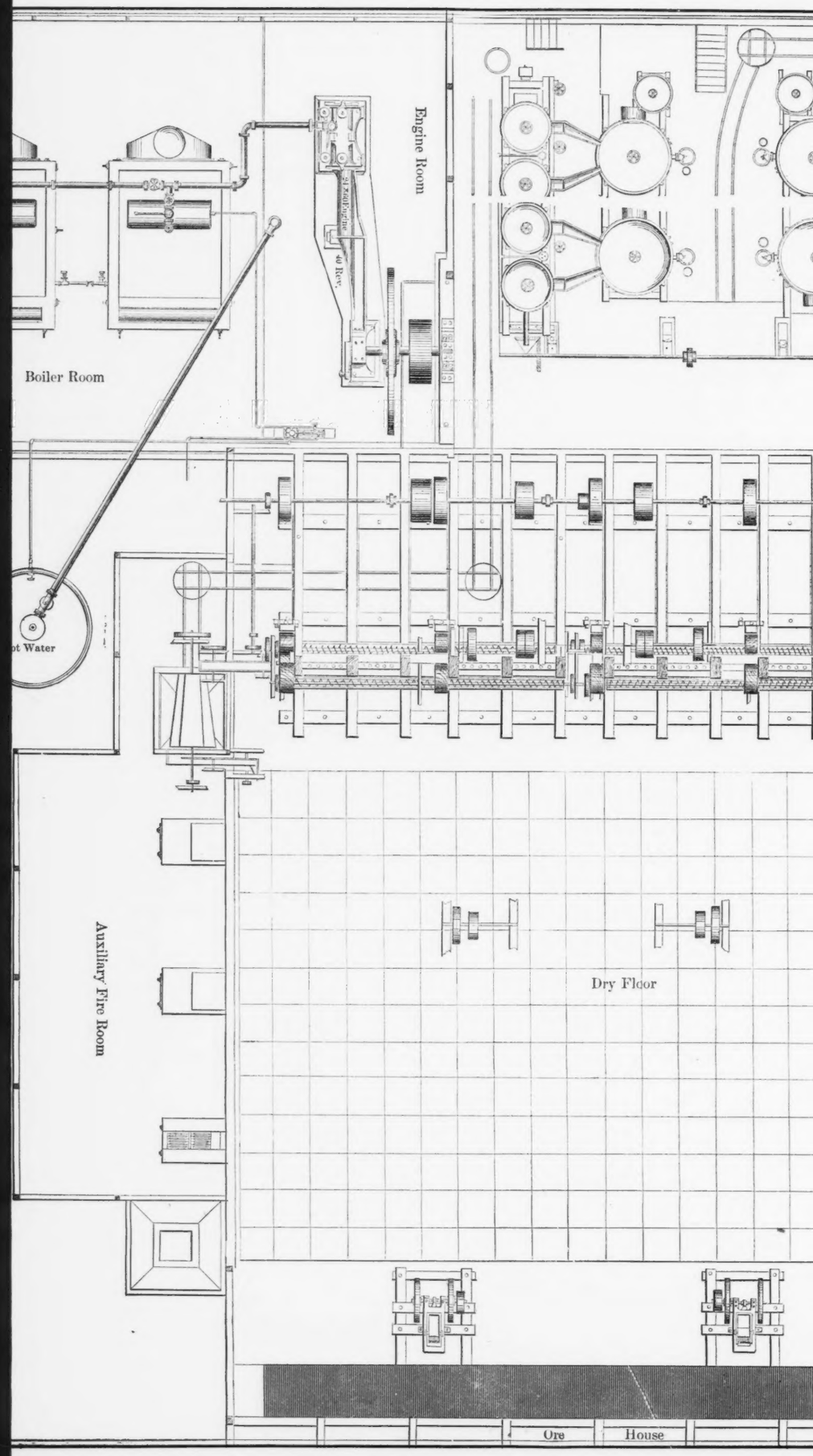

ILL, UINTAH DISTRICT, UTAH. (PLAN AND SEC

(Sectional Views.)

miles in length at least, how broad has not been even indefinitely decided. To prospect this vast area thousands of men are required, but though the diggers only number hundreds, spots have been lighted upon—M'Mac, Pilgrim's Rest, Spitz Kop, &c.—which have yielded and are yielding gold in quantity. The Bank returns show that in 1875 the Natal Bank exported over £36,000 of virgin gold from these fields; while the Cape Commercial Bank's exports for the same year exceeded £70,000. The war with Sicocoeni prevented any returns from last year, 1876; but all through the disturbances, now happily over, the diggers at Pilgrim's Rest, all Englishmen, continued to plod on, though unable to get native labor. There is a cobalt mine thirty miles to the north of Nazanth, which is yielding very satisfactorily. On the river Marico a lead mine has been worked for some time, and yields an unusually rich quality of lead, 70 per cent., besides a large quantity of silver. To the north, in the Goutpansberg district, near Marnbastadt, is a quartz reef rich in gold. Machinery has been at work there since the end of 1873 or early part of 1874. Some 250 miles to the southwest of this gold reef another has just been discovered at Zeerust, the capital of the Marico district, and machinery is being obtained at once to work it. I have thus specified several details of the mineral wealth of the Transvaal, but I would, in concluding this part of the subject, say that, in all the twelve districts into which the Transvaal is divided, only one (Potchefstroom) is without coal on the surface, and in the rest of them iron, copper, lead, gold, as well as coal and other minerals, abound. The country lies between 22° and 28° south latitude, and consequently, if it were not for the elevation of the country, it would be a tropical climate. As it is, the combination produces a happy medium between a tropical and a temperate climate. The atmosphere is light and exhilarating, and the larger proportion of sunlight and higher mean temperature (as compared with England) is highly conducive to the development and health of European constitutions.

NEW ORLEANS (LA.) COAL TRADE—1877.—Messrs. C. A. Miltenberger & Co. furnishes us with the following statement, showing the arrivals, consumption, etc., of Pittsburg coal in the New Orleans market for the year ending December 1, 1877:

Date.	Stock on Hand. Boats.	Barges.	Arrivals. Boats.	Barges.	Consumption. Boats.	Barges.	Wholesale Price. Per bbl.
January 1, 1877....	78	2	2	2	42	6	$0 30 to $0 45
February "	50	—	—	—	28	2	45 " 57½
March "	89	10	55	12	16	2	57½ " 40
April "	92	4	26	2	23	8	40 " 36
May "	108	6	39	11	23	9	35 " 30
June "	137	12	48	20	19	14	30 " 32½
July "	118	2	—	—	19	10	32½ " 28
August "	134	4	35	8	19	6	32 " 35
September "	116	4	5	—	23	—	35 " 37½
October "	86	5	1	2	24	1	37½ " 40
November "	60	1	8	—	34	4	40 " 47½
December "	44	1	17	5	33	5	50 " 35
Totals, 1877.....			236	62	303	67	

The arrivals, consumption, and price of coal given on the 1st of each month are for months previous, as, for instance, that reported on January 1 is the report for December, 1876, and so on throughout the statement.

The coal sent to planters below the city is included in the consumption, while that left on the coast above is not considered.

Of the 67 pieces consumed, designated as barges, 13 were French Creeks, or small boats.

Average contents: boats, about 9,000 bbls.; barges, 4,500 bbls.; French Creeks, 3,400 bbls.

Consumption 1869.....3,317,000 bbls.		Consumption 1874.....2,749,500 bbls.	
" 1870.....3,203,500 "		" 1875.....2,448,000 "	
" 1871.....3,112,000 "		" 1876.....2,802,700 "	
" 1872.....2,991,500 "		" 1877.....3,014,200 "	
" 1873.....2,841,500 "			

In addition to this may be added 7 boats of St. Bernard (Kentucky) coal consumed, containing 56,000 bbls.

Seven boats of Pittsburg coal were sunk in storm during September (not included in estimate of consumption).

LEHIGH VALLEY RAILROAD COMPANY'S ANNUAL MEETING.—The annual meeting of this company was held in Philadelphia, on the 15th inst. The annual report shows the gross receipts for 1877 to be $7,100,218; expenses, $3,162,822; and net income, $3,937,396. This is, compared with 1876, a decrease of $937,029 in gross earnings, $679,928 in expenses, and $257,101 in net income. From this net income of 1877 there was paid $1,526,057 interest on funded debt and gold premium, 5½ per cent. in four quarterly dividends, amounting to $1,502,356, and $847,693 in general expenses, loss on Morris Canal, and all coal operations and taxes, leaving a surplus to be carried forward of $61,289. The capital stock of the Lehigh Valley Railroad on November 30, was $27,228,855, the bonded debts $24,301,000, and the floating debt, less cash in hand, $635,813, making a total capital and debt amounting to $52,165,668, an increase of $290,540 during the year. The coal transportation of the Lehigh Valley Railroad for the year, was 4,391,286 tons, the heaviest tonnage of any year of its existence. The rates of transportation of coal from Mauch Chunk to Perth Amboy were reduced from about $1.70½ in 1876 to 98¼ in 1877—nearly one-half. During the year the company increased its investments in coal lands on the line of its road to the amount of $292,500. The business over the Easton and Amboy Railroad has largely increased, 1,405,508 tons of coal having been carried, being a gain of 524,049 tons, or about 59½ per cent. over 1876. The gross earnings of this portion of the line amounted to $1,070,752, and the direct net earnings to $548,760, a sum equal to about 5¼ per cent. of the cost of the whole work, aside from the increase in business to the main line. During the past year a mortgage for the maximum sum of $10,000,000 was made by the Easton and Amboy Railroad Company, covering all their property, and their bonds, bearing 6 per cent. interest, have been delivered to the Lehigh Valley Railroad Company to the amount of $5,000,000, in partial payment for the money expended by that company in the construction of the road.

The Lehigh Valley also holds $5,000,000 of the stock of the Easton and Amboy Company, being all that has been issued. It is not proposed at present to dispose of any of these bonds, but, should occasion require it, they will form a very desirable investment security, being a first mortgage on a double track railroad of sixty miles in length, with wharves of the fullest capacity, on tide water, having a business already established, and costing at the close of the year $10,147,345, represented by the above named $5,000,000 of stock, $5,000,000 in bonds, and an indebtedness of $147,345 to the Lehigh Valley Railroad Company. The trade over the northern connections of the Lehigh Valley has also increased largely, particularly the general freight business of the Pennsylvania and New York Canal and Railroad Company.

The vote for officers to serve for the ensuing year resulted in the election of the following gentlemen:

President—Asa Packer.

Directors—Charles Hartshorne, Wm. W. Longstreth, J. Gillingham Fell, Wm. H. Gatzmer, David Thomas, Ashbel Welch, Wm. L. Conyngham, Ario Pardee, Wm. A. Ingham, Joseph Wharton, George B. Markle, Robert H. Sayre.

INDEX OF CURRENT TECHNICAL LITERATURE.

EXCHANGES.

[In this department will be given abstracts of the more important original articles contained in current technical periodicals at home and abroad.]

The following gentlemen have kindly consented to assist in making the reviews of current technical periodicals:

JOHN C. RANDOLPH, Mining Engineer, New York.
Prof. TROWBRIDGE, School of Mines, Columbia College, New York.
Prof. H. S. MUNROE, " " " " "
Prof. T. EGLESTON, " " " " "
ARTHUR F. WENDT, Mining Engineer, New York.
MANSFIELD MERRIMAN, Yale Scientific School, New Haven, Conn.
FRANKLIN GUITERMAN, Mining Engineer, Cincinnati, Ohio.
Prof. P. de P. RICKETTS, Ph. D., School of Mines, New York.
Prof. E. A. FUERTES, Cornell University, Ithaca, New York.

ANNALES DES MINES, SEPTEMBER AND OCTOBER, 1877.—*Note on the use of the Electro Semaphore of Lartigue, Tesse & Prudhomme in the block system*, by A. Clerault....*Note on the modification of the same used by the Orleans Railroad Company*, by R. Zeiller....*Memoirs on the metallurgy of nickel*, by M. Badoureau. (This valuable memoir, consisting of 13 chapters and 100 pages, is a research on the present state of the nickel industry in Europe, undertaken in view of the recent extensive discoveries of silicated nickel ores in New Caledonia. The 12th chapter is devoted to new processes attempted in treating the New Caledonia ores. In Italy several nickel mines are explored near Varallo in the valley of Sesia, two of which were visited. One of these was at Cevia, and produces 800 tons of mineral per year, which is matted at the Sesia works near Varallo, this matte being finally treated at Oberschlemma, in Saxony. The second mine was at Sella Bassa, producing 2,000 tons of mineral per year, which are treated at Scopello. In Austria only two important mines exist. That at Leogang near Salzburg produced, in 1874, 156 tons of ore, containing 37 tons of nickel; the ores are treated on the spot. The second Austrian mine is at Schladming in Styria, and produces 30 tons of ore per year, which is treated at the works of Hopfriesen and Mandling. In Sweden there is a nickel mine at Sagmyra producing 6,000 tons of ore, from which 100 tons of matte are obtained. At Brixlegg in the Tyrol, nickel and cobalt ores are sometimes treated. In Hungary the principal mine is at Zemberg, producing 90 tons of rich ores, which are sold to the works at Losoncz, Oberschlemma, Iselon or Birmingham, and 300 tons of poor ores, which are treated at the Georges works, near Dobsina. Of these ores, nickel is contained in a sulphureted form—at Cevia, 1.20 per cent. Ni, and 1 per cent. Co; at Sella Bassa, 1.44 per cent. Ni, and 0.36 per cent. Co., and at Sagmyra, 0.50 and 0.80 per cent. Ni, in the two veins. The ores are found arseniureted at Schladming, containing 11 per cent. Ni, and 1 per cent. Co, and 38 per cent. As; and in Hungary, where the ores from the different veins contain—(1) 17 per cent. of Ni, and 10 per cent. of Co, which are sold for 2,500 francs per ton; (2) 4 to 5 per cent. Ni and Co, which are treated at the Georges works; (3) 1 per cent. ore, which is concentrated; (4) ore containing 0.25. Finally, in New Caledonia, the ore contains 18 per cent. of NiO in form of hydro-silicate. The sulphureted ores are worked for matte, as follows:

SESIA.	SCOPELLO	SAGMYRA.
Stall roasting.	No preliminary roasting.	Heap roasting.
Matte fusion—Matte, 7 per cent.	Matte fusion—Matte, 4 per cent.	Matte fusion—Matte, 2 to 4 per cent.
Matte roasting in stalls.	Matte roasting in stalls.	2d fusion—Matte, 25 to 26 per cent.
2d fusion—Matte, 30 per cent.	2d fusion—Matte, 30 per cent.	Matte roasting.
		3d fusion—Matte, 35 per cent.

At Sagmyra, attempts have been made to granulate first matte, and treat it directly in tanks with sulphuric acid. Its success depends on there being a market for green vitriol. Details are given of these operations and the apparatus. The arseniureted ores are worked for a spliss of 45 to 50 per cent. Ni, as follows:

Schladming, 1867.	Georges, 1876.
Stall roasting.	Stall roasting.
Spliss fusion—Spliss, 45 to 47 per cent.	Spliss fusion, No. 1—Spliss, 16 to 26 per cent.
	Roasting.
	2d spliss fusion—Spliss, 30–32 per cent.
	Roasting.
	3d Spliss fusion, Spliss, 50–52 per cent.

These mattes or splisses thus obtained are converted into oxidized demi-products by either the dry way or the wet way. At Sagmyra this is attained by roasting in a reverberatory furnace, feeding the powdered matte through the flame. At the Georges works in Hungary, they oxidize the spliss by two roastings in a reverberatory furnace, the first with addition of a reducing agent as powdered charcoal, and the second with a mixture of carbonate and nitrate of soda and salt. The memoir then takes up the wet methods, of which our space does not permit a resume. Enough has been said, however, to direct attention to a very valuable article.

J. C. R.

ZEITSCHRIFT DES BERG-U. HUTTENMANNISCHEN VEREINES FUR STEIERMARK U. KARNTEN, NOVEMBER, 1847.—I. Lowthian Bell, *The separation of Phosphorus*....R. Muldner, *Pipe Cutting Apparatus*....*Notes on classification of Irons and Steels.*

DECEMBER, 1877.—*The Equipment of the Wieser Coal Company's shaft at Brunn*

ASSAY DEPARTMENT OF THE ENGINEERING AND MINING JOURNAL.

This department is opened for the benefit of miners, prospectors, and others interested in minerals.

Replies will be made in these columns, and *without charge*, to questions asked regarding the natural and commercial value of minerals, and of samples sent.

Assays determining the actual composition and value of ores will be made at the following rates:

Assay for Gold.....	$2 00	Assay for Lead.....	$1 50
" Silver.....	1 50	" Zinc.....	3 00
" Gold and silver.....	2 50	Control Assays.....	3 00
" Copper.....	2 00	Zinc Analyses.....	5 00

Where reply by letter is desired, an additional charge of 50 cents should be *The amount should invariably accompany the order, and expressage or postage must always be prepaid.*

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Denver, Colorado.

OR

ENGINEERING AND MINING JOURNAL,
(P. O. Box 4404.) 27 Park Place, New York.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending Jan. 12, and years from Jan 1st.

Tons of 2,240 lb.	1878. Week.	1878. Year.	1877. Week.	1877. Year.
Wyoming Region.				
D. & H. Canal Co.	59,372	97,453	36,492	56,805
D. L. & W. RR. Co.	44,057	79,201	27,698	65,496
Penn. Coal Co.	19,512	32,885	20,356	26,513
L. V. RR. Co.	20,126	41,133	17,426	29,604
P. & N. Y. RR. Co.	616	949	448	1,061
C. RR. of N. J.	22,977	36,827	35,582	47,888
	166,660	288,448	148,102	227,367
Lehigh Region.				
L. V. RR. Co.	48,839	79,780	40,510	53 521
C. RR. of N. J.	12,812	22,609	8,609	8,640
D. H. & W. B. RR.	....	.....	....	.....
	61,651	102,389	49,119	62,161
Schuylkill Region.				
P. & R. RR. Co.	19,313	101,666	74,819	110,908
Shamokin & Lykens Val.	3,795	6,021	11,802	15,567
	23,108	107,687	86,621	126,475
Sullivan Region.				
Sul. & Erie RR. Co.	504	1,346	235	482
Total	252,323	499,868	284,078	416,485
Increase	....	83,383	....	.....
Decrease	31,755	....	....	.....

The above table does not include the amount of coal consumed and sold at the mines, which is about five per cent. of the whole production.

Receipts and shipments of coal at Chicago, Ill., for the week ending Jan. 12, and year from January 1 :

	Week. Tons.	Year. Tons.
Receipts	27,940	30,010
Shipments	4,594	7,897
Perth Amboy business:		Tons.
Received for the week		17,991
Shipped for the week		12,348
On hand Jan. 5		109,147

The increase of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Pennsylvania, Railroads amounts to 1,886 tons, as compared with the corresponding period in 1877.

Receipts of Coal at Boston, for the week ending Jan. 11, and years from Jan. 1.

Tons of 2,240 lb.	1878. Week.	1878. Year.	1877. Week.	1877. Year.
From				
Alexandria and Georgetown	....	.....	...	.. .
Philadelphia	9,100	12,635	500	4,420
Baltimore	....	.....	860	2,440
Other places	2,286	10,136	2,928	2,098
Great Britain	70	1,049	410	610
Nova Scotia	171	171	...	....
Total	11,627	23,991	3,798	10,078

Belvidere Delaware RR. report for week ending Jan. 12.	Week	Year. 1878.	Year. 1877.
Coal for shipment at Coal Port (Trenton)	...	....	....
" " " South Amboy	21,522	37,615	6,905
Coal for distribution	3,670	7,156	3,676
Coal for Company's use	1,569	2,506	2,042

The production of Bituminous Coal for the week ending Jan. 12 was as follows :

Tons of 2,000 lb., except where otherwise designated.

Cumberland Region, Md..	Week, Tons.	Year, Tons.
Tons of 2,240 lb	23,790	23,790
Barclay Region, Pa.		
Barclay RR. tons of 2,240 lb	6,725	10,328
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	3,432	4,996

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Jan. 18, 1878.

Anthracite.

On the 12th inst. all difficulties in the way of forming a coal combination were removed, and on the 16th inst. an agreement was fully entered into. The allotments agreed to were as follows.

	Per cent.
Philadelphia & Reading R. R.	28·625
Lehigh Valley Railroad	19·750
Central Railroad of N. J.	12·905
Delaware, Lackawanna & Western R. R.	12·750
Pennsylvania R. R.	7·625
Delaware & Hudson Canal	12·480
Pennsylvania Coal Co	5·865
	100·000

The programme is that previously published in this JOURNAL. Is provides for a deposit of 15cts. per ton on all coal shipped, said fund to become a forfeit at rate of $1.25 per ton upon all shipments in excess of the allotments. A board of control, comprised of representatives of each interest, with a voting power equal to the percentage of allotment of production, was appointed, Mr. Thos. Dickson being made the President, and Mr. Franklin B. Gowen the Secretary. The Board will meet in Philadelphia on the 25th inst. At this meeting, a plan to organize a Coal Exchange will be presented by the sales agents of the companies. The matter was discussed by them, at a meeting held at the Coal and Iron Exchange yesterday.

We believe that this agreement will be an ultimate injury to the anthracite coal trade as a whole, and of not even permanent benefit. Theoretically combinations are easily shown to have great advantages, but practically they have been failures. The gentlemen who have entered into this one, believe that they can prevent history from repeating itself in their case. Their ability to do so can only be determined by time. They are certainly making the effort under great disadvantages. There is hardly one representative of this compact who does not think that he has made so great a concession, as to almost overcome the anticipated advantages to be secured by a combination. Dealers and consumers are carrying large stocks of coal, which, aided by the extraordinarily mild winter, will greatly reduce the actual requirements of the market, and before the public will take its part in the programme, it will have consumed all of its speculative stock purchased when prices were low. This might not have so great an effect in bringing about a dissolution, were it not that the companies are as a rule, financially weak. In addition to all this, the bituminous interest is putting itself upon a basis to recover its lost trade, and manufacturers, steamship lines, and other consumers of coal will give it all the encouragement possible, with the hopes of breaking what might and probably would in time become, a dangerous power to these industries.

The Delaware & Hudson Canal Company has issued the following circular of prices:

Furnace	$3.25	Egg	$3.35
Steamer	3.25	Stove	3.75
Grate	3.25	Chestnut	3.50

The Lehigh prices are as follows:

Lump	$3.75	Stove	$3.75
Broken	3.50	Chestnut	3.25
Egg	3.50		

The above prices fairly represent the nominal rates. There is but little business doing, but the actual prices are very much below the above.

Already a movement has been made in the new York Legislature to investigate the coal combination with the view of ascertaining whether it is a conspiracy against the public. A dispatch to the *Times* dated Philadelphia, January 17, says:

"It was authoritatively stated in coal circles here to-day that at the meeting in New York which formed the coal combination, no compact or agreement had been signed. The feeling produced by this was very great, and intensified when it became known that the statement had been verified by President Gowen, of the Philadelphia & Reading railroad, and Mr. John E. Graeff, president of the Schuylkill County Coal Exchange. Mr. Gowen states that the terms of the combination make it binding, and there is no occasion to sign an agreement. Mr, Graeff states that no agreement was signed, because that would give the New York Legislature ground upon which to issue an injunction on the coal-carrying roads coming into New York."

Retail prices were advanced here 50c per ton to-day.

Bituminous.

There is but little business to note in this coal. Prices are unchanged. Considerable encouragement has been given to the producers of bituminous coal by the formation of the anthracite coal combination, it being believed that if the price of anthracite coal should be materially advanced, a much larger business would be done in bituminous.

The Cumberland interest does not appear to be contented with the expected advantage to be gained by this coalition, but is now awakening to the natural advantages to be secured by introducing greater economies, that it may place its coal at tide-water at even a lower figure than heretofore. To further this, a meeting was held at the rooms of the Board of Trade in Baltimore on the 15th inst. All the companies of the region were represented, except the Hampshire & Baltimore Coal Co. The proceedings were quite harmonious. It was determined to invite the miners, through a delegation, to a conference with a committee of producers appointed for that purpose.

The object of the conference is to consider the mutual interests of the miners and the companies in the necessity which exists for a reduction in wages. That a considerable reduction in wages is quite necessary cannot be denied. To place this industry on its true basis not more than 35c should be paid. We have not learned what was determined upon at the meeting, yet we think that some of the companies would feel satisfied with no greater rate than 40c. It is reported that the meeting took strong and unanimous grounds against the private drawback policy of the Baltimore & Ohio Railroad Company condemning it as unjust in its operation and unfortunate in its results, and that a united protest was made against its renewal.

Boston.

Jan. 12, 1878.

Coal continues very unsettled, with the combination still in doubt. The retail trade has as yet taken no action in the direction of advancing prices, and we reduce our quotations. The steamer *Cohanim*, from Newcastle, brought 1,300 tons, order ; and the steamer *Travancore*, from Newcastle, 792 tons, Linder & Meyer. Yesterday, in Wall Street, the coal stocks were decidedly higher, indicating a belief among speculators that a combination will take place. Last week's tonnage of the Philadelphia & Reading was 92,071 tons, against 38,761 tons last year ; Pennsylvania Coal Company, 13,374 tons, against 6,158 tons last year.

We quote Boston wholesale prices as follows :

Anthracite, broken	$4 30	Cannel, English	18 00
do. egg	4 40	do. Librsry	15 00
do. stove	4 70	do. Buckeye	11 00
Franklin	5 75	Lingan	4 50
Cumberland	4 90@5 00	Pictou	4 75
Clearfield	4 75@4 90	Penn	6 25
Westmoreland	6 25	Youghiogheny	6 25
Caledonia	4 50		

—*Commercial Bulletin.*

Cincinnati, O.

Jan. 16, 1878.

Specially reported by the Consolidated Coal and Mining Co.

During the Fall and early winter Youghiogheny coal has ruled so low that shippers claim they have lost money upon it. They have now followed the example of the anthracite producers and formed a combination or more properly a pool. All the coal that is shipped to Cincinnati and Louisville is to be sold by one man and each shipper is allotted the portion of the sales to which he is entitled. There are a few exceptions to this where the shippers are interested in the retail trade. The price of the run of coal that is just coming down the river, has been fixed at 7½ c. per bu. and it is said that every dealer, big or little will have to pay this price.

This is an advance of one half to three quarters of a cent per bushel.

Anthracite rates low, Wilkesbarre 5.75 per ton, Lehigh Chestnut 6.50 per ton of 2000 lbs. on cars here.

Youghiogheny delivered to consumers at	11c	Afloat	7½c
Camden "	" 9c	"	5½c
Cannel "	" 17 to 18c	"	13c
Anthracite "	" $7 to $8 per ton.		

Philadelphia.

Jan. 17, 1878.

Specially Reported,

Until the details of the new compact are arranged there will be very little trade—dealers are well supplied, the weather is moderate and there is no pressure for coal from any quarter. The stoppage agreed upon amongst the Schuylkill operators ends on the 21st, but it is doubtful that a resumption can take place at that time. Before the week ends a meeting of the Schuylkill operators will fix prices. Shipments are almost at a stand still.

San Francisco, Cal.

From the *Commercial Herald* of Jan. 10, 1878.

Supplies of Anthracite are very considerable and the market exceedingly sluggish, the few sales made, partaking largely of a jobbing character at low and nominal prices. We note the arrival of the bark Aglaica from Newcastle. N. S. W., with 1,105 tons. The Monte Rosa's cargo of 1,715 tons Wallsend has been sold to the Gas Company at $7 12½. We notice that some of our dealers are advertising to deliver to families Seatle from the yard at $10 per short ton. This is the lowest price yet at which good family Coal has ever been sold in this city. This description of Bituminous compares favorably with the product of the British Columbia mines, Nanaimo, Wellington, etc. These are really superior house Coals and to a very great extent have dsiplaced Coos Bay, Bellingham Bay, etc. partly by reason of a lessened production of these two last named. Heretofore West Hartley, Wallsend, and Liverpool Orrel were used almost exclusively with some Anthracite in families hereabout, but now Pacific Coals named have largely taken their place. The ship Three Brothers, 112 days from Liverpool, is to hand with a full cargo—say 3,473 tons. The last sale of West Hartley ex-ship was made at $8.50. We quote Australian at $7@7 50.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, Jan. 18, 1878.

American Pig.—There has been no business worthy of note. Prices and supplies are unchanged, although there is a great deal more iron going into stock. The price of coal to furnaces has not been advanced under the new coal combination, but iron masters are quite uncertain of their ability in the future to manufacture iron as at low rates as during the past six months. If the prices of coal should advance, as is quite probable, the price of iron will have to do so, or a number of furnaces will have to be blown out. We quote nominally as follows : No. 1 foundry, $18 ; No. 2 foundry, $17 ; forge, 16.

Scotch Pig.—With nothing more than a very quiet retail business, we quote as follows: Eglinton, $24: Coltness, $26. and Glengarnock, $24.50.

Rails.—The *Railroad Gazette* of to-day, in an elaborate review of the railway construction of 1877, gives the milage of new roads laid with track at 2,199, as against 2,460 in 1876: 1,561 in 1875; 2,025 in 1874; 3,883 in 1873; and 7,340 in 1872. It makes the tota miles of main lines now built 96,669, and says that the present rate of construction is fully as great as the increase in population and traffic. It further says that there is about $100 per individual, invested in railroads in the United States, and that there are but 575 inhabitants per mile of road, as against 3,310 in Europe.

We have again a very large business to report. The Erie Railway has purchased 25,000 tons of steel rails, at $41.75 per ton, delivered on the line of its road. The order was given to Troy, Bethlehem and Harrisburg mills. It is said that the Scranton mill made a bid fully 75 cents per ton less than the price at which contracts were awarded, and although it makes an unexceptionable quality, from some cause, it did not get a portion of the order. In addition to this we are reported an additional purchase by the Pennsylvania Railroad Company, of 10,000 tons of steel rails, and purchases by sundry western roads, amounting to 13,500 tons more. The important business so far, has been on the basis of about $40 at mill. There is an inclination to firmness in prices, which would seem natural from the large amount of orders already booked.

Old Rails.—Without business; we quote these at $18 @ $18.50.

Wrought Scrap is nominal at $22 @ $23.

Baltimore, Md. Jan. 14, 1878.

Specially reported by Messrs. R. C. HOFFMAN & Co.

The iron market remains without change with a moderate demand. Sales are made at about the following rates:

Baltimore Charcoal	$29@30	Mottled and White	$14@15 00
Virginia Charcoal	28@30	Charcoal C.B.Blooms	50@55 00
Anthracite No. 1	19@20	" " Billetts.	55@60 00
" " 2	18@19	Refined Blooms	45@50 00
Anthracite No. 3	17@18		

Chattanooga, Tenn. Jan. 14, 1878.

Specially reported by J. F. JAMES, dealer in pig iron, ores, etc

Little or nothing has been done in pig iron during the past week. Business in general continues depressed, financial matters very unsatisfactory, and the outlook is anything but encouraging.

Tenn., Ala. and Ga. Charcoal, No. 1 Foundry	$18 00@19 00		
Tenn., Ala. and Ga. Charcoal, No. 2 Foundry	17 00@18 00		
Tenn., Ala. and Ga. Charcoal, Gray Forge	15 00@16 00		
Tenn., Ala. and Ga. Coke, No. 1 Foundry	19 00@20 00		
Tenn., Ala. and Ga. Coke, No. 2 Foundry	17 00@18 00		
Tenn., Ala. and Ga. Coke, Gray Forge	15 00@16 00		
Charcoal or Coke, white and mottled	14 00@15 00		
Tenn., Ala. and Ga. Cold Blast (car wheel)	22 00@28 00		
Old rails	18 00@19 00	Wrought scrap,	
Old car wheels	16 00@17 00	No. 2	12 00
Wrought scrap,		Cast scrap	10 00
No. 1	17 00	Muck bar	32 00@33 00

Iron Ores.

Red Hematite (about 55 per cent. metallic iron) f. o. c. at mines	1 25
Brown Hematite (about 55 per cent. metallic iron)	1 75

Louisville, Ky. Jan. 15, 1878.

Specially reported by Messrs. GEORGE H. HULL & Co.

A fair demand for all grades of iron continues with few changes in prices worthy of mention, although the market seems weaker than at last report. The usual time, four months, allowed on quotations below.

FOUNDRY IRONS.

No. 1 Hanging Rock, Charcoal	$22 00@23 00
No. 2 " " "	20 00@21 00
No. 1 Southern Charcoal	20 00@21 00
No. 2 " "	19 00@20 00
No. 1 Hanging Rock, Stonecoal and Coke	20 00@22 00
No. 2 " " " " "	19 00@20 00
No. 1 Southern Stonecoal and Coke	19 00@20 00
No. 2 " " " "	18 00@19 00
"American Scotch"	20 00@22 00
Silver Gray	18 00@19 00

MILL IRONS.

No. 1 Charcoal, Cold-short and Neutral	18 00@19 00
No. 1 Stonecoal and Coke, Cold-short and Neutral	17 00@18 50
No. 2 " " " " "	16 50@17 00
No. 1 Missouri and Indiana Red-short	20 00@22 00
White and Mottled, Cold-short and Neutral	14 00@16 00

CAR-WHEEL AND MALLEABLE IRON.

Hanging Rock, and Cold Blast	34 00@37 00
Alabama and Georgia "	24 00@33 00
Kentucky Cold-blast	25 00@33 00

Philadelphia, Pa.

[Weekly Report of the Philadelphia Iron Market, furnished for THE ENGINEERING AND MINING JOURNAL, by JUSTICE COX, Jr., & Co., Iron Merchants, 333 Walnut Street, Philadelphia, Week ending Jan. 17, 1878.]

PIG IRON.—The market for pig is exceedingly firm, and some companies are asking a slight advance or rather refusing to accept the prices ruling last week. The coal combination having come to an agreement, there will be no more cutting in prices of coal, and some think an advance will be demanded from the furnaces, if such should be the case, the price of pig must advance, as few, if any, makers are getting cost out of their production. This feeling seems to have stimulated inquiry the last day or two as the offers for large or small lots, at anything off full prices are plenty with few if any takers. We report sales of 3,000 tons, and quote $18 to $20 per No. 1; $17 to $18 per No. 2; $16 to 18 for Gray Forge.

MANUFACTURED IRON.—The demand for bar is much better than for some months with less desire to cut by outside mills. In plate iron quite a demand is reported, and prices are firm with a desire by several mills to advance. In tank nothing new is reported; the every day trade continues good and small orders are plentiful. In angles and other shape iron there is quite a demand with an advance of fully 2-10 is reported. In skelp little or nothing is doing; an order for small iron was placed this week at nothing under 2c. If the maker can see money in this he must have a sharp eye. We quote bar at 2@2 1-10: plate and tank, 2⅛@6c per lb.; skelp, 2 1-10@2¼c per lb.

RAILS.—The demand for steel rails is reported good with several large contracts in the market, prices do not advance as was expected, but anything under full quoted prices is refused. In iron rails only small lots are finding sale, but in the aggregate make quite a business. We quote steel $40 to $43. Iron $33 to $35. All at mills.

OLD RAILS.—The sale of old rails is not as frequent as some time back when every week brought reports of large sales at low prices, now holders will not sell except at fully two dollars over summer quotations. We report sale of 200 tons at $20, and quote $20 to $21.

OLD WHEELS.—The stock of old wheels does not diminish much, and low prices are the rule. We quote Philadelphia $17@18. Wrought scrap does not find ready sales, and low prices would be accepted for round lots. We quote at $20@24. In cast only a hand to mouth business is doing. We quote cast at $12@16.

MUCK BARS.—There is more demand for muck bars and full prices are ruling. We report sales of 500 tons at $34 cash, and quote at $33@35, as to qnality.

Pittsburgh, Pa. Jan. 15, 1878.

Specially reported by A. H. CHILDS

There is no improvement to report in this market. Prices are nominally unchanged, but owing to the long continued dullness hardly so firm.

	4 mos.		4 mos.
No. 1 F'dry	$21 00@22 00	Mottled & White	$16 00@18 00
" 2 "	19 00@20 50	Hot blast C'coal	20 00@25 00
Gray Forge	17 50@20 00	Cold " Western	38 00@40 00

Richmond, Va. Jan. 16, 1878.

Specially reported by ASA SNYDER, Esq.

The pig iron market continues without animation. The few small transactions occurring are on the basis of the closing quotations of the old year.

Virginia Cold Blast Charcoal Pig Iron, cold short			$20 to $26
" " " " " "		neutral	28 to 31
" Warm " " " "			20 to 25
" Anthracite	1 X		20 to 22
" "	2 X		19 to 21
" "	2		18 to 19
" "	Coke West Va.	1 X	22 to 23
		X 2	21 to 22

San Francisco, Cal.

From the *Commercial Herald*, January 10, 1878.

Metals.—We have nothing of an encouraging nature to remark. Business in all departments is very slack and prices largely nominal. Our stock of Pig Iron of all kinds in first and second hands is computed at 17,365 tons, being 1,900 tons in excess of the same time last year. The consumption for the year past is estimated at 15,563 tons; now known to be on the way, 3,400 tons. The consumption of Pig Iron in 1877, was 3,766 tons less than in 1876, of Soft, 3,009 tons, and 747 tons White Iron. Imports of Pig Iron in 1877, 5,753 tons less than in 1876.

St. Louis, Mo. Jan. 15, 1878.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

The market opens with fair prospects of a good demand for the year 1878. The prices we expect will remain firm, and we feel confident that red short iron must go higher, especially charcoal, red short mill, as there are no stocks either in the hands of our commission agents or at the furnaces. Old rails are declining in prices.

COLD BLAST CHARCOAL—ALL NUMBERS.

Hanging Rock	25@38	Assorted Bar Iron	$2, rates.
Tennessee	26@30	No. 1 Wrought Scrap	80c. cwt.
Kentucky	26@30	Heavy cast "	65 "
Missouri	26@30	Light " "	55 "
Georgia	26@30	Old rails	19 00 to 20 00
Alabama	26@30	Old car wheels	17 00 to 18 00

	No. 1.	No. 2.	Mill.	White and Mottl'd.
Missouri stone coal	$22 00	$21 00	$20 00	19 00
" charcoal	22 00	21 00	20 00	20 00
Tennessee charcoal	22 50	21 00	20 00	19 00
Tenn. coke very soft and strong	23 00	21 00	20 00	18 50
Hanging Rock charcoal	25 00	24 00	23 00	.....
" " cold short	24 00	23 00	.....	.....
	Ex No.1	No. 1.	B No. 1.	No. 2.
Alice Hanging Rock coke	$25 00	$24 50	$24 00	$22 50
Quinnimount, W.Va., coke	23 50	23 00	22 00	21 00

METALS.

NEW YORK, FRIDAY EVENING, Jan. 18, 1878.

The whole market continues to be very quiet. The statistics showing the very large consumption during 1877, give some encouragement for this year, yet the agitation of the silver and tariff questions are having a demoralizing effect.

Gold Coin.—During the week under review the price of gold has ranged from 102⅜ to 101⅞ and closed at 101⅞.

Bullion.—The firmer tone of the market on Monday and Tuesday was lost on Wedn esday—India bill day in London—and the market continues nominal at the following rates with no feature worthy of comment. London 53⅝ @ 53¾d; New York 115,¾ @ 116c.; and San Francisco, 10 per cent. discount.

Daily Range of Silver in London and New York per oz

Date.	London. Pence	New York. Cents	Date.	London. Pence	New York. Cents
Jan. 12	54	116	Jan. 16	53⅞	116
" 14	54	116	" 17	53¾	115¾
" 15	"	116¼	" 18	53¾	115¾

BULLION SHIPMENTS.

We give below a statement showing the amount of Bullion shipments in addition to those announced in our issue of Jan. 12.

December	Leopard	Nevada	$*21,882 09
January	Grand Prize	"	†29,216 03
"	Martin White	"	20,000 00
"	Standard	California	67,558 00
"	Manhattan	"	20,003 00

†Total product for month.

*The Bullion product of this mine for December was $139,058.

THE SAN FRANCISCO MINT COINAGE FOR 1877.—Coiner Cicott, of the San Francisco Mint, gives the following statement of the coinage at the United States Mint in that city, during the year 1877:

Gold.	*No. of Pieces.*
Double eagles $34,700,000	1,735,000
Eagles 173,000	17,000
Half eagles 135,500	26,700
Quarter eagles 88,500	36,400
Total gold $35,092,000	1.814,100
Silver.	
Trade dollars $ 9,519,000	9,519,000
Half dollars 2,678,000	5,356,000
Quarter dollars 2,249,000	8,996,000
Dimes 234,000	2,340,000
Total silver $14,680,000	26,211,000
*Grand total $49,722,000	28,025,100

THE SILVER MOVEMENTS FOR ELEVEN YEARS. The *Inter-Ocean* of the 15th inst, publishes the following tables, showing the Export and Import movement of silver during the past eleven fiscal years, ending with the 30th of June:

DOMESTIC EXPORTS OF SILVER.

Years' ending June 30.	Bullion.	Coin.	Per cent.
1867	$15,853,530	$2,892,990	34·099
1868	12,978,311	2,536,506	18·526
1869	14,858,369	899,763	37·719
1870	11,748,864	3,554,329	34·872
1871	17,285,916	2,535,765	23·484
1872	22,729,657	1,691,081	33·546
1873	27,759,066	1,674,442	39·826
1874	22,498,782	4,555,418	45·317
1875	17,197,914	5,115,670	26·609
1876	15,240,344	5,366,590	41·182
1877	11,483,894	9,292,743	48·166
Totals	$189,634,647	$40,115,297	33·136

EXPORTS OF IMPORTS OF SILVER.

Years ending June 30.	Bullion.	Coin.	Per cent.
1867	$18,939	$3,076,286	52·531
1868	169,068	5,703,873	58·506
1869	233,174	6,428,518	46·839
1870	2,682	9,213,829	64·578
1771	.....	11,934,099	85·0c9
1872	164,033	5,744,003	83·455
1873	85,795	10,232,556	96·406
1874	25,000	5,508,785	79·844
1875	11,835	2,825,746	34·291
1876	15,995	4,706,323	73·015
1877	334,167	8,462,059	67·520
Totals	$1,060,688	$73,836,077	67·507

IMPORT ENTRIES OF SILVER.

Years ending June 30.	Bullion.	Coin.	Per cent.
1867	$61,998	$4,983,611	22·861
1868	90,410	5,360,515	38·418
1869	55,142	5,620,166	28·652
1870	162,432	14,199,797	54·363
1871	105,836	14,280,627	67·637
1872	380,909	4,645,322	36·571
1873	471,715	12,326,775	59·581
1874	837,683	8,114,086	31·459
1875	1,295,754	5,908,170	34·467
1876	1,058,177	6,885,795	49·847
1877	4,693,252	9,834,927	35·631
Totals	$9,213,309	$92,159,791	41·369

It appears, on combining bullion and coin, that the silver movement for the eleven years was as follows: Domestic exports, $229,749,944; exports of imports, $74,896,765; aggregate exports, $304,646,709; imports, $101,373,103; excess of exports over imports, $203,273,606. Our exports of gold for the same period were $499,659,993, or not far from double of our exports of silver. This proportion indicates that our chances of retaining and accumulating silver, as compared with gold, are about two to one in favor of the former metal.

Copper.—The sales during the week have not exceeded 200,000 lb. at 17½ @ 17¾c. The market closes at 17⅝ @ 17¾c. Chili Bars were quoted in London yesterday at £66. By mail of the 5th inst. we are advised that upon the announcement of the death of Mr. Augustine Edwards, the great Chilian banker, etc., who was supposed to hold or control 20,000 to 25,000 tons of copper, the market declined to £65 under the supposition that this large quantity would be forced upon the market. The recovery would indicate that such is not likely to be the case, while it is believed that for a time it may be completely locked up in the hands of the executors.

Messrs. Heyne Bros. furnish us with the aproximate figures of production and consumption, as follows:

	lbs.	lbs.
Stock, Jan. 1, 1877		8,000,000
Product Lake Superior, 1877	37,000,000	
" North Carolina, Tennessee, Vermont, Arizona, New Mexico, etc.	8,000,000	
		45,000,000
		53,000,000
Consumption		34,000,000
		19,000,000
Export of Ingot		11,500,000
Stock, Jan. 1, 1878		7,500,000

Mr. Edward P. White gives us the following figures:

	lbs.
Stock, Eastern ports, Jan. 1, 1877	8,000,000
Receipts from Lake Superior	36,000,000
" " Baltimore, Arizona, etc.	3,000,000
" " Vermont, Tennessee, Ore Knob etc.	4,000.000
	51,000,000
Exported in 1877:	11,500,000
Exported (estimated) cartridges, brass and other mfgs.	8,500,000
	20,000,000
Leaving balance for consumption, and stock on hand at end of year	31,000,000
	51,000,000

Mr. White, like others in the trade, has been unable to learn the actual stock on hand, and therefore leaves this item and that of consumption an open one. He estimates that of the stock on hand, 1,500,000 lb. is engaged for export, and that there will arrive overland from the Osceola, Pewabic, Atlantic, Franklin, Phenix and Allouez, 3,500,000 lbs. while the supplies from all other sources will reach about 3,000,000 lbs. before the arrival of shipments by the Lakes, giving us a total supply of 36,000,000 lbs. for 17½ months' domestic consumption.

Messrs. von Dadelszen & Company, of London, under date of January 4, says: "Copper was quiet until about the second week of December, when Chili Bars advanced from £63.10 to £67.10, and a large business was done. The excitement, however, did not last long, and we have since declined to £65.10 to £66 for G. O. B. which is our present quotation. Other sorts sympathized with Chili. In Australian, Wallaroo has advanced from £73 to 76. Burra £72 to £74.10

The Chili Charters for the first half of December were 1,600 tons, all for England, and for the second half, 2,600 tons (700 tons to Continent). The arrivals in Liverpool and Swansea were 2,919 tons, and the deliveries 2,569 tons.

At the Swansea Ticketing on the 11th December the average price was 11/8 per unit for 7 5-16 per cent. produce, and on 1st inst. 12/. per unit for 5 5-16 per cent. produce.

A sale of 500 tons Cape Ore was made by tender on 2d inst. at 12/9¾ per unit.

English Smelters advanced their prices to £73 for Tough, £74 for Select, and £78 for Strong Sheets, but have lately been easier. We now quote Tough £71 to £72, Select £72.10 to £73.10, and Strong Sheets, £76 to £78. The following are the stocks:

	Dec. 1st, 1877. Tons.	Jan. 1st, 1878. Tons.	Jan. 1st, 1877. Tons.	Jan. 1st, 1876. Tons.
Stock, Liverpool and Swansea	17,110	17,460	14,560	12,400
" Havre	8,017	8,400	8,565	1,647
" London	5,184	5,130	2,902	6,034
Chili Produce afloat and chartered by Mail & Cable	30,311 / 10,000	30,990 / 9,600	26,027 / 12,620	20,081 / 12,300
Total	40,311	40,590	38,647	32,381
Australian afloat	782	1,000	3,185	2,345

Tin.—Straits in London was yesterday quoted at £64 @£64/10; Singapore, $18.25 per picul, and Penang, $18. We are reported a sale of 50 tons of Straits, due here in February, at 14½c. The market on spot is quoted as follows: Straits, 14⅞c. @15c. gold: L. & F., 15c. @ 15⅛c.; Refined, 15c. @ 15¼c.

Messrs. von Dadelszen & Co. of London under date of January 4 say: "Tin has fluctuated about £3 per ton during the past month, the market being mainly affected by the reports regarding the shipments from Australia. On the 17th of December a Reuter's telegram was received, stating the Australian shipments for November to have been 51,000 ingots, which had a most depressing effect, although looked on as incorrect. A correct message was received on the 22d of December stating them to have been only 15,000 ingots, but both of these are unreliable. The cable having been interrupted it is very difficult to get authentic information. The same doubt exists about the December shipments. A well-informed firm states them to have been 1,200 tons, and gives the total quantity afloat as 2,700 tons. We have estimated the quantity now afloat at 1,700, but we are quite open to correction by mail advices.

"The shipments from the Straits has again been small, only 90 tons to England for December.

"A glance at the figures will show that our landed stocks have again decreased, and that were it not for the fear of large arrivals from Australia we should be in a fair road to improvement.

"The delivery in Holand of Banca was 380 tons, of Billiton 273 tons, and Australian 27 tons, while from London warehouses it was 681 tons, exclusive of 262 tons in transit to America.

"Straits has been sold at about the same price as Australian, but the bulk of the business has been in the latter kind. Prices advanced from £66 to £67.10, declined to £65.15, improved to £67.10 again, but has since declined to £65, our present quotation for both Straits and Australian.

"Banca in Holand has fluctuated between f. 41 to f. 42, closing at f. 40¾. Billiton sold from f. 39½ to f. 41¼, closing at f. 39¾.

"English has been in but moderate demand, and prices receded to £71 for ingot, £72 for bars, and £73 for refined."

The following are the Statistics of Foreign Tin, here and in Holland, compared with the preceding month, and the two preceding years.

	Dec. 1st. 1877. Tons.	Jan. 1st. 1878. Tons.	Jan. 1st. 1877. Tons.	Jan. 1st. 1876. Tons.
Banca on Warrants, Holland	1,580	1,200	1,093	830
Billiton " " ..	1,246	1,216	982	948
Australian " " ..	577	550	730	—
Foreign Tin in Warehouse, London	8,737	8,593	7,648	6,019
Total Available Stock.	12,140	11,559	10,453	7,797
Billiton Afloat for Holland	950	1,020	1,200	1,024
Straits " " London	557	400	750	800
Australian	1,000	1,700	2,000	2,000
Total Afloat	2,507	3,120	3,950	3,824
Banca Arrived for coming sales	365	897	628	2,110
Banca Afloat per Sailing Vessels	330	198	483	412
Price of Straits	£67	£66	£76	£81

London Statistics of Foreign Tin—	1877.	1876.	1875.
Foreign Tin Arrived during twelve months in London	13,568	14,920	16,107
Foreign Tin delivered during 12 months from London	12,508	13,258	12,984
Foreign Tin Afloat during twelve months to London	2,100	2,750	2,800
Foreign Tin in Stock 31st December in London	8,593	7,648	6,019

Tin Plates.—These are very quiet, and quoted as follows, in gold, per box: Charcoal tins, $6.12½ @ $6.25, and ternes, $5.87½ @ $5.75; Coke tins, $5.25 @ $5.37½, and teners nominal at $5.37½.

Messrs. Robert Crooks & Co., of Liverpool, under date of January 3, say of Tin and Terne Plates; "Very little has been done in any description lately, and all alterations are to lower figures. The outlook is considered by makers so unpromising that they will take the lowest current rates for delivery two or three months forward, while even these apparently tempting terms have not led to much business."

Lead.—This article is nominal at 4¼c. with nothing doing.

The shipments of Lead from London and Liverpool, to China and Japan, for the past three years, have been as follows:

	1877 Tons.	1876 Tons.	1875 Tons.
China	14,709	9,177	8,880
Japan	1,760	150	21
Total	16,469	9,327	8,901

Spelter And Zinc.—Spelter is quiet at 5⅝ @ 5¾c. Sheet zinc is weak and quiet at 7c.

Antimony is firmer, being quoted at 11¾@12c. gold for Hallett's, and 12¾c. for Cookson's.

Quicksilver.—The San Francisco *Commercial Herald* of Jan. 10, says: "Advices from London having reached us that purchases in that market have recently been made at £7, holders here were induced to sell at 45c. At which price a car load has been taken for New York. At this writing 45c must be considered an outside quotation. The demand is light. Receipts for the week, 1,561 flasks.

Salt Lake Ore and Metal Market.

SALT LAKE CITY, UTAH, January 18, 1878.

Argentiferous Lead (Base Bullion). — $35 @ 37 per ton for lead; $1.15 @ 1.16 per ounce for silver: $20 per ounce for gold. The quotations for silver are based upon the silver contents in the lead of 80 to 120 ounces per ton of 2,000 lb.

The Sacramento-California Smelting Works.—The *Sacramento Record-Union*, says: "These works have had almost a constant run for the year. The furnaces were cool but twenty days out of the eleven months of business here reported to (December 1st). The establishments worked 4,070 tons of ore and 1,560 tons of flux. It consumed 1,460 tons of coke and 1,996 cords of wood, and produced 1,514 tons of refined lead and 148,356 ounces of dore bullion, of the assay value of $238,989. The value of consumed material was $500 per day."

Mr. J. B. Meader, under date of the 12th inst., gives the following shipments of lead for the year 1877:

		Pounds.
Shipments of Base Bullion for December		4,325,543
On hand in Salt Lake		760,473
Shipments for 11 months		44,311,888
Total for year 1877		49,397,904
Ore shipments for December reduced to Lead	291,880	
Ore shipments for 11 months reduced to Lead	6,235,973	
		6,527,853
Total production of Lead for 1877		55,925,957

Statement of bullion and ore shipped from Salt Lake City during week ending Jan. 5, 1878:

BULLION.

Consignor. Smelting Works	Consignee.	lb.	Totals.
Mingo	Penna. Lead Co.	303,401	
Telegraph	" "	188,881	
Durell	" "	42,397	534,679
Morgan	Omaha Lead Co.	87,951	
Germania	" "	84,215	
Frisco	" "	20,710	192,876
Pascoe	Hagen & Billings, N.Y.		21,787
Waterman bullion on hand per Behr & Steiner			749,342
New York			760,473

ORE.

Consignor.	Consignee.	lb.	Totals
Flagstaff mine,	Hilliard S. W.		174,080
Raymond & Ely mine, Conct'd tailings, Omaha	S. W.	21,750	
Conkling Sample Works,	" "	60,000	81,750
			$255,830

FINANCIAL.

New York Stocks.

NEW YORK, Friday Evening, Jan. 18, 1878.

Notwithstanding the formation of the coal combination and the advancement of prices we have no improvement to note in the value of the shares of the companies interested. The quotations may be rated fairly steady. The total operations of the week were about 150,000 shares.

The Lehigh and Wilkes-Barre Consolidated Bonds; We give below the substance of the Committee's Report as prepared at the instigation of the Consolidated Bondholders of the Lehigh and Wilkes Barre Company. "That the bonds held by the Central Railroad of New Jersey to the amount of $5,384,000 or thereabouts, be made Preferred Consolidated Bonds of the Lehigh and Wilkes-Barre Coal Company; said preference to be secured in such manner, that the balance of the issue of said Cons. mortgage bonds owned by said railroad and coal companies, but now hypothecated to secure certain debts of said companies, also all of said bonds in the possession of receivers of said companies. That the net earnings of said coal company, after paying the interest upon the liens prior to said consolidated mortgage, shall be appropriated and applied as follows: 1. To the payment of the interest upon said income bonds. 2. To the payment of the interest upon the said amount of $5,384,000 of preferred consolidated mortgage bonds. 3. To the payments into sinking fund as hereinafter provided. 4. To the payment of the interest upon the said $6,116,900 of consolidated mortgage bonds.

That the said Lehigh and Wilkesbarre Coal Company shall, on the 1st day of January, 1882, and quarterly thereafter, pay to trustees appointed for that purpose, a sum equal to 10 cents per ton, for each and every ton of coal mined by said company. 1. To the extinguishment of the mortgage liens upon said Coal Company's lands, prior to the lien of the consolidated mortgage. 2. To the purchase of the said Coal Company's sterling bonds. 3. To the purchase of said income bonds. 4.

COAL TRANSPORTATION AND GENERAL MINING STOCKS.

Name and Location of Company.		Feet on Vein.	Capital Stock	Shares. No.	Shares. Par Val.	Assessments. Total levied to date.	Assessments. Date and amount per share of last. Mo.	Yr.	Amt.	Dividends. Total paid to date.	Last Dividend. Mo.	Yr.	Amt.	Rate per Ann	Highest and Lowest Quotations per Share in Currency. Jan. 12. H.	L.	Jan. 14. H.	L.	Jan. 15. H.	L.	Jan. 16. H.	L.	Jan. 17. H.	L.	Jan. 18. H.	L.	Sales.
Coal Stocks.			$			$				$				Per cent.								*					
Consol. Coal	Md.	....	10,250,000	102,500	$100	*	.....	.....	.....	...	Jan.	1877	2½	10	..	..	..	..	..	..	..	..	..	..	..	..	....
Del. & H. Canal	Pa.	....	20,000,000	200,000	100	*	.....	.....	.....	38,821,104	Aug.	1876	4	9	51	49½	52¾	51½	52½	49¾	51¼	49¾	51½	50½	51	50⅜	17,986
Del., Lac. & W. RR.	Pa.	....	26,200,000	524,000	50	*	.....	.....	.....	....	July	1876	2½	5	50¾	49⅝	52⅝	51⅛	52⅜	50⅝	51⅜	50⅝	51⅞	51½	51¼	50½	124,824
Lehigh C. & Nav.	Pa.	....	10,448,550	208,971	50	*	.....	.....	.....	....	Nov.	1876	1½	5½	..	..	19⅜	19⅛	19	18⅞	18⅞	18¾	..	..	18¾	18⅝	1,845
Lehigh Valley RR.	Pa.	....	27,042,900	540,858	50	*	.....	.....	.....	....	Oct.	1877	1	5	41	40⅝	42	41¼	42¼	42	42	42	42	41¾	41⅞	41½	3,917
Maryland Coal	Md.	....	4,400,000	44,000	100	*	.....	.....	.....	....	Jan.	1876	1½	1½	..	..	..	..	..	..	..	..	..	..	..	9½	100
N. J. Central RR.	Pa.	....	20,600,000	206,000	100	*	.....	.....	.....	....	Apr.	1876	2½	2½	16¾	16¼	18½	17	18	16¾	17½	16⅜	17¼	16⅞	16	16	8,811
Penna. Coal	Pa.	....	5,000,000	100,000	50	*	.....	.....	.....	....	Aug.	1877	3	12	..	..	..	..	..	..	..	..	..	..	..	..	152	....
Pennsylvania RR.	Pa.	....	68,870,200	1,377,404	50	*	.....	.....	.....	....	Nov.	1877	1½	8	33⅛	32⅞	33⅛	32⅞	33	32½	32⅝	32⅛	32⅝	32¼	32½	32⅜	36,283
Phil. & Read. RR.	Pa.	....	34,278,175	685,563	50	*	....	....	.....	43,012,497	Jan.	1876	*2½	10	16⅛	16⅜	17¼	17	17⅛	16⅜	16¾	16⅜	16⅝	16½	16⅜	16½	27,134
General Mining Stocks																											
American	Colo.	....	1,000,000	100,000	10	*	.....	.....	.....	20,000	Jan.	1878	0	10	12	10⅜	..	10½	10⅜	10⅝	10⅜	..	..	10¾	10	10⅜	10	3,405
Belcher, G. S.	Nev.	1,040	10,400,000	104,000	100	1,176,400	Dec.	1877	1 00	15,397,200	Apr.	1876	$1	00	12	..	..	..	..	..	..	..	..	..	..	..	..	....
Bobtail, G.	Colo.	2,500	1 736,630	227,326	5	*	.....	.....	.....	56,831	Nov.	1877	25	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Bobtail Tunnel, G.	Colo.	....	100,000	20,000	5	52,000	July	1873	0 30	40,000	Dec.	1877	50	20	..	..	..	..	..	..	..	..	..	..	..	..	....
California, G. S.	Nev.	600	54,000,000	540,000	100	...	.....	.....	.....	22,680,000	Jan.	1878	2	00	74	..	..	..	..	..	30	29½	..	..	28	..	..	50
Chollar Potosi, G. S.	Nev.	1,400	2,800,000	28,000	100	1,500,000	Oct.	1877	3	00	3,080,000	Feb.	1872	1	00	12	..	..	..	..	..	..	..	..	..	..	..	....
Cons. Virginia, G. S.	Nev.	710	54,000,000	540,000	100	474,600	June	1873	3	00	36,720,000	Jan.	1878	2	00	24	..	..	..	..	..	..	..	..	..	..	..	....
Confidence, G. S.	Nev.	130	2,496,000	24,960	100	243,840	Mar.	1873	1	00	78,000	May.	1865	8	⅓	8⅓	..	..	..	..	..	..	..	..	..	..	..	....
Cons. Hercules & Roe.	Colo.	16,500	1,000,000	100,000	10	*	.....	.....	.....	120,000	...	...	...	...	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Crown Point, G. S.	Nev.	600	10,000,000	100,000	100	1,573,370	Sept.	1877	1	00	11,588,000	Jan.	1875	2	00	24	..	..	..	..	..	..	..	..	..	..	..	....
Eureka Cons. G. S. L.	Nev.	..	5,000,000	50,000	100	100,000	May	1876	1	00	1,300,000	Oct.	1877	3	00	24	..	..	..	..	..	..	..	..	..	..	..	....
Eureka G. Mg. G.	Cal'f	1,680	2,000,0000	20,000	100	.....	.....	.....	.....	2,134,000	Aug.	1877	2	00	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Gould and Curry, G. S.	Nev.	612	10,800,000	108,000	100	2,558,000	Dec.	1877	1	00	3,826,800	Oct.	1870	10	00	..	..	..	..	..	..	..	..	..	..	..	..	....
Hale & Norcross, G. S.	Nev.	400	11,200,000	112,000	100	2,747,000	Dec.	1877	1	00	1,598,000	Apr.	1871	5	00	12	..	..	..	..	..	..	..	..	..	..	..	....
Hukill, G. S.	Colo.	3,288	1,000,000	100,000	10	*	.....	.....	.....	120,000	Jan	1878	0	10	12	..	..	4¼	..	4¾	4⅛	..	..	..	..	4⅝	..	1,500
Kentuck, G. S.	Nev.	95	3,000,000	30,000	100	270,000	Dec.	1874	1	00	1,252,000	Mar.	1870	5	00	..	..	..	..	..	..	..	..	..	..	..	..	....
Leopard, L. G. S.	Nev.	1,500	5,000,000	50,000	100	100,000	July.	1877	50	162,500	Dec.	1876	0	50	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Merrimac, S.	Mass	1,500	500,000	50,000	10	*	.....	.....	.....	100,000	Dec.	1877	0	10	12	..	..	..	..	..	..	..	..	..	..	..	..	....
Moose	Colo.	39,000	2,000,000	200,000	10	*	.....	.....	.....	175,600	Jan.	1878	0	25	10	7¾	7⅝	7¾	7⅝	8⅛	7⅜	8¼	8⅛	8¼	8	8⅛	8	13,550
N. Y. & Colo., G.	Colo.	....	1,000,000	50,000	20	*	.....	.....	.....	20.000	Mar.	1877	0	20	..	..	..	..	..	..	..	..	..	2⅛	..	2⅛	..	400
Northern Belle, S.	Nev.	1,600	5,000,000	50,000	100	...	.....	.....	.....	1,400,000	Oct.	1877	1	00	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Ontario.	Utah	3,000	10,000,000	100,000	100	....	....	....	.....	900,000	Jan.	1878	50	6	30⅛	..	..	..	30⅛	..	30⅛	30⅜	..	..	..	..	..	720
Ophir, G. S.	Nev.	675	10,080,000	100,800	100	2,934,400	May.	1875	2	00	1,394,400	Mar.	1864	4	00	..	..	..	..	..	..	..	..	..	..	..	..	....
Raymond and Ely, G. S.	Nev.	5,000	3,000,000	30,000	100	540,000	Dec.	1876	1	00	3,075,000	Sept.	1873	3	00	..	..	..	..	..	..	..	..	8½	..	..	..	50
St. Joseph, L.	Mo.	2600 acs.	1,000,000	100,000	10	.....	....	....	.....	250,000	....	....	.....	.....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Savage, G. S.	Nev.	800	11,200,000	112,000	100	3,650,500	Jan.	1878	1	00	4,460,000	June	1869	3	00	..	..	..	..	..	..	..	..	..	..	..	..	....
Seaton, G. S.	Colo.	1,700	500,000	50,000	10	*	.....	.....	.....	10,000	May.	1877	0	10	12	1.35	..	..	..	..	..	1.50	..	..	..	..	..	200
Sierra Nevada G. S.	Nev.	3,650	10,000,000	100,000	100	1,900,000	Jan.	1878	0	50	102,500	Jan.	1871	1	00	10	..	..	..	..	..	..	..	..	..	..	..	....
Yellow Jacket, G. S.	Nev.	1,200	12,000,000	120,000	100	3,438,000	Jan.	1878	2	00	2,184,000	Aug.	1871	2	50	..	..	..	..	..	..	..	..	..	..	..	..	....
Alpha Cons. G. S.	Nev.	300	3,00 0,000	30,00	100	210,000	Aug.	1877	$1	00	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Am. Flag, G.	Colo.	5,300	600 ,000	60,000	10	*	....	....	....	....	....	....	....	....	..	11c	..	9c	..	..	..	..	..	..	..	10c	9c	1,100
Bertha & Edith G.	Vir.	645 acs.	3,500,000	350,000	10	*	....	....	....	....	....	....	....	....	..	6c	..	..	..	4c	..	4c	..	..	..	4c	..	1,800
Best and Belcher, G. S.	Nev.	545	10,080,000	100,800	100	337,792	Aug.	1877	1	00	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Bullion, G. S.	Nev.	943½	10,000,000	100,000	100	2,702,000	Oct.	1877	1	50	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Caledonia, G. S.	Nev.	2,188	10,000,000	100,000	100	1,435,000	Oct.	1877	75	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Cleveland, G.	Colo.	3.715	250.000	25,000	10	*	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Cons. Imperial, G. S.	Nev.	468	50,000,000	500,000	100	575,000	Oct.	1877	0	20	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Con. N. Slope & E. C. T.	Colo.	15,000	500,000	10,000	50	*	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Douglas	Colo.	21,000	1,000,000	10,000	100	*	.....	.....	.....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Exchequer, G. S.	Nev.	400	10,000,000	100,000	100	280,000	Sept.	1876	1	00	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Granville Gold	N. C.	9,000	1,000,000	100,000	10	*	.....	.....	0	50	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Henry Tunnel	Nev.	3,000	2,000,000	80,000	25	*	.....	.....	.....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Julia Cons., G. S.	Nev.	3,000	11,000,000	110,000	100	440,000	Aug.	1877	1	00	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Justice, G. S.	Nev.	2,100	10,500,000	105,000	100	2,027,500	Oct.	1877	2	00	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Kings Mountain, G.	N. C.	....	1,200,000	120,000	10	*	....	....	....	....	....	....	....	....	..	3	2⅞	3⅛	3	3¼	3	3⅛	3	3¼	3	3¼	3⅛	10,900
Lacrosse	Colo.	3,900	1,000,000	100,000	10	*	....	....	....	....	....	....	....	....	..	37c	34c	4cc	35c	4cc	37c	37c	36c	38c	36c	35c	..	7,800
Lucerne Mining	Colo.	4,200	5,000,000	500,000	10	*	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Mariposa, preferred	Cal.	44.387	5,000,000	50,000	100	1,425,000	June	1877	1	00	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
" common	"	acres.	10,000,000	100,000	100	1,425,000	June	1877	1	00	....	....	....	....	..	1½	..	..	..	1¼	..	..	..	..	..	..	..	300
Memphis	Colo.	6,000	300,000	60,000	5	*	....	....	....	....	....	....	....	....	..	..	..	..	..	25c	..	..	..	..	..	..	..	100
Mexican, G. S.	Nev.	600	10,080,000	100,800	100	181.440	Aug.	1877	0	30	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Original Comstock, G. S.	Nev.	....	10,000,000	10,000	100	*	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Overman, G. S.	Nev.	1,200	3,840,000	38,400	100	2,567,880	Nov.	1877	3	00	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Pleasant View, G.	Colo	1,200	200,000	20,000	10	*	.....	.....	.....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Quicksil. preferred	Cal.	8,500	4,291,300			*	.....	.....	.....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
" common	"	acres.	5,708,700	100,000	100	....	.....	.....	.....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Santiago, G. S.	Nev.	2,000	11,200,000	112,000	100	....	....	....	.....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Seg. Belcher. G. S.	Nev.	160	640,000	6,400	100	244,800	Apr.	1876	5	00	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Silver City, G. S.	Nev.	3,900	6,310,000	63,100	100	15.775	Nov.	1876	0	25	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Silver Hill, G. S.	Nev.	5,400	5,400,000	54,000	100	102,600	Dec.	1877	1	00	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
South Comstock, G. S.	Nev.	1,50c	10,000,000	100,000	100	54,000	Jan	1877	0	25	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
South. California, G. S.	Nev.	1,500	5,000,000	50,000	100	12,500	Feb.	1877	0	25	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Southern Star. G. S.	Nev.	1,500	6,000,000	600,000	100	....	.....	.....	.....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	100
Trenton, G. S.	Nev.	..	10.000,000	100,000	100	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	1.15	..	....
Union Cons., G. S.	Nev.	850	10,000,000	100,000	100	285,000	Oct.	1877	25	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
West Belcher, G. S.	Nev.	1,000	10,000,000	100,000	100	....	.....	.....	.....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Young America, S.	Nev.	1,000	3,000,000	30,000	100	64.500	Oct.	1877	0	20	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Copper Stocks.																											
Calumet & Hecla, C.	Mich.	..	2,000,000	80,000	25	1,200,000	.....	.....	.....	12,250,000	Oct.	1877	5	00	20	.....		.....		.....		.....		.....		.....		....
Central, C.	Mich.	..	500,000	20,000	25	100,000	June	1862	0	65	1,160,000	Feb.	1877	7	00	..	.....		.....		.....		.....		.....		.....	....
Copper Falls, C.	Mich.	..	1,000,000	20,000	50	535,000	May.	1876	.....		100,000	Nov.	1871	1	00	..	.....		.....		.....		.....		.....		.....	....
Franklin, C.	Mich.	..	500,000	20,000	25	360,000	June	1876	5	00	585,000	Nov.	1871	1	00	..	.....		.....		.....		.....		.....		.....	....
Minesota, C.	Mich.	..	1,000,000	20,000	50	436,000	June	1869	1	00	1,820,000	Mar.	1876	0	50	..	.....		.....		.....		.....		.....		.....	....
National, C.	Mich.	..	500,000	20,000	25	195,000	Oct.	1875	1	00	360,000	Oct.	1873	1	00	..	.....		.....		.....		.....		.....		.....	....
Pewabic, C.	Mich.	..	500,000	20,000	25	185,000	June	1868	3	00	460000	July	1873	1	00	..	.....		.....		.....		.....		.....		.....	....
Phenix, C.	Mich.	..	1,000,000	20,000	50	817,500	Sept.	1870	3	00	20,000	Jan	1876	1	00	..	.....		.....		.....		.....		.....		.....	....
Quincy, C.	Mich.	..	200,000	20,000	10	....	.....	.....	.....	2,130,000	Feb.	1877	4	00	..	.....		.....		.....		.....		.....		.....	....
Ridge, C.	Mich.	..	500,000	20,000	25	200,000	.....	.....	.....	90,000	Feb.	1875	1	00	..	.....		.....		.....		.....		.....		.....	....
Allouez, C.	Mich.	..	1,000,000	20,000	50	940,000	May.	1876	5	00	....	....	....	....	..	.....		.....		.....		.....		.....		.....	....
Dana, C.	Mich.	..	500,000	20,000	25	68,000	Jan.	1863	0	50	....	....	....	....	..	.....		.....		.....		.....		.....		.....	....
Dawson, S.	Ont.	..	1,200,000	60,000	20	....	.....	.....	.....	....	....	....	....	....	..	.....		.....		.....		.....		.....		.....	....
Duncan, S.	Ont.	..	1,200,000	60,000	20	75,000	July.	1876	41⅔		....	....	....	....	..	.....		.....		.....		.....		.....		.....	....
Humboldt, C.	Mich.	..	500,000	20,000	25	100,000	Sept.	1876	0	15	....	....	....	....	..	.....		.....		.....		.....		.....		.....	....
International, S.	Ont.	..	1,200,000	60,000	20	....	.....	.....	.....	....	....	....	....	....	..	.....		.....		.....		.....		.....		.....	....
Madison, C.	Mich.	..	500,000	20,000	25	123,000	Sept.	1876	0	10	....	....	....	....	..	.....		.....		.....		.....		.....		.....	....
Mesnard, C.	Mich.	..	500,000	20,000	25	160,000	Apr.	1876	0	50	....	....	....	....	..	.....		.....		.....		.....		.....		.....	....
Osceola, C.	Mich.	..	1,000,000	40,000	25	880,000	May.	1876	2	00	....	....	....	....	..	.....		.....		.....		.....		.....		.....	....
Petherick, C.	Mich.	..	500,000	20,000	25	165,533	Mar.	1876	0	50	....	....	....	....	..	.....		.....		.....		.....		.....		.....	....
Rockland, C.	Mich.	..	500,000	20,000	25	495,000	Jan.	1874	1	00	....	....	....	....	..	.....		.....		.....		.....		.....		.....	....
Star, C.	Mich.	..	500,000	20,000	25	265,000	Mar.	1876	0	50	....	....	....	....	..	.....		.....		.....		.....		.....		.....	....
Superior, C.	Mich.	..	500,000	20,000	25	340,000	Mar.	1874	0	25	....	....	....	....	..	.....		.....		.....		.....		.....		.....	....

G. Gold. S. Silver. L. Lead. C. Copper. * Non-Assessable.

Total Assessments levied to date ..... 47,045,530 | Total Sales of coal stocks for the week ..... 220,900 shares.
Total Mining Dividends disbursed to date ..... 214,462,832 | Total Sales of Mining Shares for the week ..... 41,975 "

* A dividend of 3½ per cent. was declared on the preferred stock of this Co. in July, 1877.

To the purchase of said preferred consolidated mortgage bonds. All such purchases to be made at the lowest prices attainable, at or under par. That the said Central Railroad Company of New Jersey shall, by a proper agreement in writing, bind itself to transport the coal of said Coal Company at rates to be from time to time agreed upon, which rates shall be as favorable as those made to any other shipper, including lateral rates and terminal charges."

The Iron and Steel Company of Ironton, Ohio, called a meeting of their creditors on the 10th inst., to make some arrangement about the indebtedness of the Company. The creditors represented about $50,000, and proposed to take 25 cents on the dollar in cash. The Company offered that amount, but wanted five or six years to pay it. They hold another meeting next week.

Central Railroad of New Jersey $20,000 of the 7 per cent. Con. M'tge., Bonds, Interest, Coupons payable quarterly, due 1889 Hyp., $1,000 each, sold at auction the 16, inst., at 65¾ per cent.

Miscellaneous Sales and Quotations.

Sales and quotations of the stocks and bonds dealt in here at Philadelphia, and Baltimore for the week ending the 18th inst. are given in the following tables. The Philadelphia quotations will have a * affixed. The Baltimore quotations are indicated thus †.

STOCKS.

	Quotations.—Highest.	Lowest.	Closing.	Sales Shares
American Coal Co.	—	—	35	—
*Cambria Iron Co.	—	—	50¼	—
*Pennsylvania Salt Manf'g Co.	—	—	65½	5
*Westmoreland Coal Co.	—	—	65	—
*Buck Mountain Coal Co.	—	—	25	—
*Schuylkill Nav. Co	—	—	—	—
St. Louis, I. M. & S. RR. Co.	6¾	6½	6	—
Spring Mountain Coal Co.	—	—	35	—
†Balt. & Ohio RR. Co. pref.	96	96	96	55
" " common	—	—	91	90
†Pittsburg & Connellsville RR.	—	—	—	—
†George's Creek Coal Co.	—	—	99	—
†Santa Clara Mining Co.	—	—	8¾	—
†Atlantic Coal Co.	—	—	1.40	100

BONDS.

D. L. & W. 7s, Convt., 1892	J. & D.	—	—	—	—
" " 2d mtge., 1881	M. & S.	107	—	106	$500
N. J. C., 1st mtge., new	F. & A.	113	112⅞	113	29,000
" " 1st mt., cons. 1899	Q.	66¾	66¼	66	27,000
" " Convt	M. & N.	63¼	62½	62	37,000
L. & W. B. Coal Co., cons.	Q.	35½	34½	—	83,000
Am. Dock & Imp. 7s	J. & J.	44	—	42	5,000
D. & H. C. Co., 1st m., 1884	J. & J.	96	—	95⅝	1,000
" " " " 1891	J. & J.	109½	—	96	3,000
" " " " 1877	J. & J.	—	—	—	—
" " " " reg., 1894	A. & O.	—	—	—	—
" " " " coup., 1894	A. & O.	94⅜	93	94¼	16,000
St. L. I. M. & S., 1st mt. 1892	F. & A.	102⅜	100	100	5,000
Ches. & Ohio, 1st mt., 1899	—	25	24	20	7,000
*L. V. RR., con. m. 6s, 1923	J. & D.	96	95½	95¾	16,000
" " 2d m., 7s, 1910	M. & S.	115	114½	114½	5,000
" " reg., 1898	J. & D.	—	—	—	—
" " coup., 1898	J. & D.	109	—	—	1,000
*P. RR., 1st mtge., 1880	J. & J.	106	105½	105½	8,000
" Gen. mtge. reg., 1910	A. & O.	—	—	107½	—
" Con. m. 6s. cou.. 1905	J. & D.	—	—	93	—
" " " reg. 1905	Q.	93	—	92	2,000
" gen. M. Coup., 1910	J. & J.	107	—	106¾	9,000
" New Loan 5s	—	109¼	109½	—	6,000
*P. & R. RR., 7s, 1893	A. & O.	—	—	—	—
" " con. m. 7s. cou. 1911	J. & D.	102	101¾	102	12,000
" " Deb. 6s, 1893	J. & J.	—	—	—	—
" " New convt. 7s. 1893	J. & J.	‡30	—	—	1,000
" " Con. mtge. 7s. reg.	J. & D.	102	101½	101	15,000
" " 6s, 44-80 1880	J. & J.	102¾	—	—	5,000
*P. & R. C. & I. Co. Deb. 7s	M. & S.	—	—	40	—
*P. & R. C. & I. Co.	—	—	—	—	—
*L. C. & N. Co. 6s. 1884	M. & Q.	104¼	—	104½	2,500
" " RR. loan 1897	F. & Q.	103½	103	103½	1,600
" " Con. mtge. 7s.	J. & D.	—	—	—	—
" " Cvt. gold, 1894	M. & S.	94	—	94¼	8,000
" "Gold Loan, 1897	J. & D.	86½	86	86	15,000
Schuylkill Nav., 6s. 1897	M. & Q.	6⅜	—	—	1,000
Pa. and N. Y. Canal, 7s.	J. & D.	111½	111¼	111	5,000
Pa. Canal Co.	J. & J.	—	—	59½	—
Susquehanna Coal Co. 6s.	—	—	—	—	—
†Ches. & Ohio 1st m. 6s.	M. & N.	—	—	—	—
†Balt. & Ohio 6s. 1880	J. & J.	—	—	101	—
† " " 6s. 1885	A. & O.	—	—	105	—

Total transactions for the week.....$314,600

‡ Ex-Coupon.

Philadelphia Stocks.

PHILADELPHIA, Friday Evening, Jan. 18, 1878.

The transactions in coal stocks on the Philadelphia market during the past week amount to about 65,000 shares. The market at the close is generally lower than reported in our last. There has been no special feature during the business of the week.

North Pennsylvania Railroad Co.—This company held its annual meeting on the 14th inst. The twenty-fifth annual report of the Board of Directors was presented, showing the result of the business for the fiscal year ending with October 31, 1877. The total earnings for the year were: $1,482,705 20; this sum was made up from the following trafic: From passengers, $626,265 78; coal, $104,211 88; pig iron, $15,357 45; lumber, $19,306 88; local freight, $244,298 91; through freight, $342,779 26; mails, $5,846 40; miscellaneous, $34,638 64. As compared with the Centennial year the receipts from passenger traffic this year indicated a decrease of $170,675 87; the decrease in receipts from coal, local freight, and miscellaneous showed $122,170 75, or a total decrease in receipts of $292,846 62.

The Diamond Coal Company announces a dividend of $1 per. share, payable on demand.

AUCTION SALES during the week, *East Pennsylvania Railroad Company;* 150 shares at $34 per share. *Pennsylvania Salt Manufacturing Company;* 177 shares at 65 and 65¼ per share.

Allentown Rolling Mill Company; The annual meeting of the stockholders of this Company will take place January 30th.

Copper Stocks.

Reported by Wilson W. Fay & Co., Room 7, Traveler Building, 31 State Street, Brokers in Mining and Miscellaneous Stocks.

BOSTON, WEDNESDAY EVENING, Jan. 16, 1878.

The market for the week has been comparatively active with a certain undertone of strength throughout the list which transforms into a very decided degree of strength in some of the large stocks.

The interest displayed in these stocks is undoubtedly on the increase and there is a disposition shown by outsiders to invest such as has not shown itself for some time, which will eventually stir up an excitement that will be very agreeable after so dull a time. Calumet and Hecla is unusually strong, the Company having declared a dividend of $5.00 per share payable Feb. 15th 1878. The stock has advanced to 180⅞ bid, and 181 asked, and large amounts of stock changing hands.

Copper Falls is firm at at 2¼@2½, and sales at 2½.

National is weak, the stock being offered for almost nothing (assessment nupaid) and scarcely a bidder for it.

Osceola is somewhat in demand, although there has been no transactions to our knowledge, it closing at $17 bid and $18 asked.

Pewabic remains unchanged to any extent, being a trifle weak if anything.

Quincy is strong and greatly in demand, and has advanced to 40½ bid and 40¾ asked.

Ridge is a little stronger at 1⅝@1¾.

Duncan silver is very weak and has declined to 2 bid and 2¼ asked, there being rumor of another assessment, although whether there is any foundation for it or not we are at present unable to state.

International has fallen to, 37 bid and, 40 asked, and is rather weak.

Merrimac silver closes steady at $3.75@4.

Gold and Silver Stocks.

NEW YORK, FRIDAY EVENING, Jan. 18, 1878.

We note a very quiet market in mining shares during the week under review. The bulk of the transactions being confined to those stocks which have been prominent in the dealings of the Board for some weeks past, Moose closes at an advance, with sales of 13,550 shares for the week. Kings Mountain has changed hands to the extent of nearly 11,000 shares and closes at a slight advance. We note statement that this Co. has made a contract for working some 30,000 tons of tailings on its property for 60 per cent of the net returns. It is thought that this will amount to an important item to the Co. the trailings being the accummulation of years and they will probably pay well if properly treated.

The *Indicator* says: "There is considerable gossip regarding the probable establishment of a branch in New York of the Bank of Nevada, with a capital of $20,0000,000. The object is said to be to loan money upon mining stocks, the transfer books of which shall be kept with the bank. It is to be hoped that the scheme will carry through, for it is a most pitiable sight to witness the efforts of a numberof the members of the Mining Exchange to keep body and soul together."

Savage Mining Company.—A dispatch from San Francisco says: The Savage mine has levied an assessment of $1 per share, delinquent February 15. This assessment is probably called for the purpose of providing more funds for pumping machinery, etc. The large amount of water in this mine appears to be the great hindrance to its further development.

California Gold and Silver Mining Company.—The annual meeting of this company was held in San Francisco, yesterday. The Secretary's report showed a balance on hand at the beginning of the year, amounting to $1,346,635.25. The receipts were $18,950,682.42, and the disbursements, $20,090,240.74, including $14,040,000 in dividends, leaving a balance on hand of $207,076.93. The following is a summary of the report of the Superintendent: Yield of ore for the year, 217,432 tons; amount reduced, 213,683 tons, yielding bullion of the value of $18,924,850.27, of which $9,380,745.47 is gold. Considerable work has been done on the 1,400-foot level, but not enough to determine where ore exists. The workings are much in need of repairs. Much ore has been taken from the 1,500-foot level. The last low grade in the northern portion of the level is only partially explored, the drifts terminating in a body of poor quartz. A vast quantity of high grade ore has been taken from the 1,550-foot level, considerable of good quality remaining, and a large quantity of medium grade. To the eastward of the main ore body there is a large body of low grade quartz yet undeveloped. From the 1,600-foot level 105,723 tons of ore have been taken, a large amount of good quality remaining. Two hundred and forty feet of ore body in the south end of the level is still untouched, except by a winze passing through it, showing good ore throughout. There is reason to believe that the whole block is of the same quality. There is a great quantity of ore in the 1,650-foot level, but little has been taken out, except at the southern boundary. Much more work is necessary to determine the value of this level. The 1,700-foot level is partially developed at the north end, but little is known of it. The ore body on the 1,750-foot level is very wide and well defined, but the greater portion is of too low a grade to pay for mining and milling. Good ore is confined to the east wall and does not exceed 28 feet in width. It is believed that much ore exists between this and the next level below. The opening of the 1,840-foot level has been commenced from the Ophir mine. A large amount of work is being done in keeping the works in repair. The report contains no recommendation of a reduction in dividends. The old Board of Trustees were re-elected without opposition.

The product of this mine during the past year is the largest of that of any mine in the country's history. If the output of the consolidated Virginia Company is added to that of the California we have a total product of two mines whose aggregate length on the vein is only 1,310 feet, of $32,658,850. These companies have paid to their stockholders during the year $22,680,000 as dividends, California contributing $14,040,000 and consolidated Virginia $8,640,000.

We give below a statement showing the output in tons, value per ton, and relative amounts of gold and silver produced by these two companies during 1877:

	Tons Reduced.	Value Per Ton.	Gold Produced.	Silver Produced.
California...	213,683	$93.	$9,386,745	$9,538,105
Consolidated Virginia...	143,200	96	6,210,518	7,523,482
Totals...	356,883		$15,597,263	$17,061,581

Eureka Consolidated Mining Company. This stock opened in San Francisco to-day at $37 per share. This company declared a dividend of $3, per share yesterday equal to $150,000. Notwithstanding the shutting down of the furnaces for about six months, this Company shipped during the year 1877 the amount of 15,214,000 pounds or 7,607 tons of crude bullion. The value of this bullion, figuring it at an average of $260 per ton, will aggregate about $2,000,000.

Ontario Silver Mining Co.—About 700 shares of the stock of this Co. changed hands during the week at fairly steady prices the product of this Co. from the 1st to the 11th inst. inclusive, was 30 bars of bullion having an assay value of $55,661.78. Recent advices from the mine state: Since last report the stopes, in the mine have produced as usuul, and no new developments have been made worthy of note. The 500 foot level is now driven 147 feet west of the shaft, and is now in better ore than we have had for the last fifty feet, and the face of the drift is still improving as we drive ahead. The same level east of the shaft is also in good ore and very promising. Both ore-houses at mine and mill are full.

MINING STOCK QUOTATIONS IN SAN FRANCISCO.

We give below a table showing the closing prices of mining shares in San Francisco yesterday.

Alpha	12½	Mexican	14¼
Belcher	5¾	Northern Belle	11¾
Best & Belcher	19	Ophir	51
Bullion	5	Original Comstock	..
Caledonia	3¾	Overman	20¼
California	26½	Raymond & Ely	8
Chollar Potosi	34¼	Santiago	..
Con. Imperial	1	Savage	11½
Con. Virginia	23	Seg. Belcher	35
Confidence	5¼	Sierra Nevada	4½
Crown Point	5½	Silver City	..
Eureka	37	Silver Hill	3¼
Exchequer	3⅛	South Comstock	..
Gould & Curry	9¾	South California	..
Hale & Norcross	9¾	Southern Star	..
Indian Queen	..	Trenton	..
Julia	3½	Union Con	6¾
Justice	10½	West Belcher	..
Kentuck	4½	Yellow Jacket	9¾
Kossuth	..	Young America	..
Leopard	1		

The *Commercial Herald* of the 10th inst., says of the market: "The mining stock market has been somewhat stronger during the past week, owing greatly to the increased production of the bonanza mines and the reported discovery of another bononza in the lower levels of the Alta. The activity was very general and the disposition to sell kept pace with the demand, or rather exceeded the demand, thereby causing a slight weakness at the close. The aggregate sales for the week foot up $2,460,000. California has been well maintained. On the 1,750 level the work continues in hard blasting rock, and the drift on the 1,840 level continues to pass through a mixture of quartz, clay, and porphyry of no value, and is perfectly dry. Con. Virginia is in better request. On the 1,650 level the various ore stopes are looking well, and as they advance southward the ore continues in excellent quality. The reports of the operations on the lower levels are quite conflicting."

San Francisco Stock Exchange Sales.—The *Journal of Commerce,* says: "The report of the San Francisco Stock and Exchange Board sales for 1877 shows a heavy decline from the report for 1876. The former shows sales valued at $119,809,860 only as against $225,765,475 in the latter. This is a decline of nearly one-half in the value of sales. The cause is traceable to lower prices, and a failure of confidence in the public generally as to the probable future of the mines whose stocks were sold. The decline of $106,000,000 in values affected general trade very seriously in this city. Arizona is soon bound to come into the field, and when she does she will rival Nevada in the value of the mines that she offers the public an interest in."

Assessments with dates when delinquent—Sierra Nevada, 50c, Feb. 7; New Coso, 50c, Feb. 11; Gold Hill (Grass Valley), 25c, Feb. 11; Dear Creek, $6, Feb. 8; Julia, 75c; Mint. 10c; Silver Prize, 10c; Yellow Jacket, $2; Oregon Consolidated Gold and Silver Mining Co., 25c, Feb. 17; Nevada, 10c, Feb. 12; Savage, $1, Feb. 15.

The Grand Prize Silver Mining Co. of Nevada has declared a dividend of $1 per share.

The Standard Gold Mining Company, Mono County, Cal., has declared its fifth consecutive monthly dividend of $1 per share.